MASTER THESIS

WHAT ARE THEY TALKING ABOUT? -

SEARCHING FOR THE CHARACTERISTICS OF COVID-19 CONSPIRACY THEORY COMMUNITIES FORMED ON TWITTER

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Abstract

Introduction: With the rise of the COVID-19 pandemic, COVID-19 conspiracy theories emerged as well. COVID-19 conspiracy theories are related to social and political events. Believing in COVID-19 conspiracy theories can stem from different concepts, including demographics, sensemaking, a perceived lack of control and social identification. The latter contributes to the forming of communities, which also happens on Twitter. Twitter contributes to the spread of COVID-19 conspiracy theories and allows for polarization due to the lack of content moderation. The information bias and homophily are expected to contribute to conspiracy belief in communities as well, due to people not encountering information and opinions contrary to their beliefs. Still, little is known about the characteristics of the communities of COVID-19 conspiracy believers.

Method: Out of 541,294 tweets concerning COVID-19, a dataset of 84,655 COVID-19 conspiracy tweets sent between the 3rd of January 2020 and the 19th of January 2021 had been selected with a bag of words approach. These tweets made up the corpus for a topic analysis which looked into the most used hashtags and a timeline of when tweets were sent. Furthermore, a network analysis was executed in which the communities within the network were detected. Nine communities were individually analyzed into depth by looking into the most used hashtags, most used words, the five most important users, and the timeline of when the tweets were sent.

Results: Common topics in the corpus were Viruswaarheid, specific COVID-19 conspiracy theories and politics. These topics were also prevalent in the nine analyzed communities. Communities distinguished themselves from the others based on the topics discussed. In all communities, a mix of COVID-19 conspiracy believers and COVID-19 conspiracy opposers was found although the ratio differed. Social identification was also detected, the COVID-19 conspiracy believers and COVID-19 conspiracy opposers insulted and spoke ill of each other. The COVID-19 conspiracy believers were also angry and suspicious towards the government regarding the COVID-19 pandemic.

Conclusion: COVID-19 conspiracy communities form based on topics, meaning they form around specific COVID-19 conspiracy theories or subjects which were also discussed in the mainstream public debate. Political topics are also often present, especially because collective narcissism among the COVID-19 conspiracy believers caused the scapegoating of the government. Social identification took place among COVID-19 conspiracy believers and COVID-19 conspiracy opposers separately, although it did not in the communities as both groups were present in those. The information bias and homophily have both not been detected, further strengthening the view that COVID-19 conspiracy communities are formed based upon specific COVID-19 conspiracy topics.

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TABLE OF CONTENT

1. INTRODUCTION

Since the beginning of 2020, the world has endured the COVID-19 pandemic. While the WHO reports that this virus is transmitted by animals, most likely by bats and even a secondary animal (Nederlandse Omroep Stichting (NOS), 2021b), not everyone believes this. Multiple theories on the emergence and underlying plans of the COVID-19 virus surfaced. Such as COVID-19 being a hoax and being made up, it being an operation initiated by world leaders to reduce the population, or Bill Gates trying to use the vaccine to implant a nanochip into people to gain control over them. Social media can enable the spread of conspiracy theories, Twitter in particular (Monaci, 2021). However, little is known about the interactions COVID-19 conspiracy believers have on Twitter and how these COVID-19 conspiracy theories spread on Twitter. Therefore, this research will focus on the communication surrounding COVID-19 conspiracy beliefs on twitter.

COVID-19 conspiracy theories appeared with the emergence of COVID-19. This was predictable as conspiracy theories have been around for a long time, often appearing in times of crises and uncertainty. Based upon multiple sources, Douglas et al. (2019) define conspiracy theories as "attempts to explain the ultimate causes of significant social and political events and circumstances with claims of secret plots by two or more powerful actors" (p. 4). In the situation of COVID-19, this manifests itself in people trying to explain the emergence of COVID-19 with unproven theories. As a result, conspiracy theories about the purpose and emergence of COVID-19 are spread and getting well-known among the general public.

With conspiracy theories being related to political and social events, they can have far going consequences. For example, conspiracy theories can cause discord, political mistrust, and even violence, which can be used to distract from political issues or subvert the democratic debate (Furnham, 2021). Some additionally consequences for specific COVID-19 conspiracy belief can be identified, such as a higher chances of contracting COVID-19 and social consequences.

When one believes COVID-19 conspiracies it can lead to a bigger risk of getting COVID-19 because of the misinformation one encounters, a negative influence on preventative behaviour and lower vaccine acceptance. Misinformation is linked to COVID-19 conspiracy theories, as affiliating with COVID-19 conspiracy theories is related to having less accurate knowledge about COVID-19 while misinformation and being misinformed about COVID-19 are predictors of contracting COVID-19 (Moore et al., 2021). Conspiracy theories can negatively affect preventative behaviours (Douglas, 2021), as people believing in conspiracies regarding COVID-19 being a hoax are less likely to engage in preventative behaviours (Chan et al., 2021). These people were less inclined to follow official guidelines and deemed the pandemic less threatening (Imhoff & Lamberty, 2020). In short, COVID-19 conspiracy believers are more likely to get COVID-19.

In addition to lower adherence to preventative behaviours, COVID-19 conspiracy belief can cause people to be less accepting of a COVID-19 vaccine (Wirawan et al., 2021). It is demonstrated by the negative attitude towards vaccination campaigns caused by the misinformation of the conspiracy theories (Buturoiu et al., 2021). Some COVID-19 conspiracy theories questioned the safety

of the vaccine while the motivations for getting the vaccine were perceived as bribes (Caserotti et al., 2021). Overall, conspiracy believers are more hesitant to get the COVID-19 vaccine (Caserotti et al., 2021). Conspiracy theories cause people to reject mainstream medicine as well, resulting in a higher chance to contract COVID-19 compared to non-conspiracy believers (Douglas et al., 2019). As such, COVID-19 conspiracy belief can have direct negative consequences for the health of the believer.

Besides these direct individual consequences, conspiracy belief can lead to profound social consequences. For instance, conspiracy believers have lower levels of trust in the government (Šrol et al., 2022) or even distrust the government (Buturoiu et al., 2021). On a societal level this might be problematic, as trust is necessary to ensure that people follow the set guidelines, such as wearing facemasks and social distancing (Falcone et al., 2020). These guidelines were issued to reduce the spread of COVID-19 among society, not following them will consequently contribute to the spread of COVID-19. Another societal issue caused by conspiracy belief is that people who believe in the COVID-19 conspiracy theories self-reported to be more likely to undertake violent actions (Šrol et al., 2022). Associated with this is that conspiracy believers also participate in street protests (Buturoiu et al., 2021) which can turn violent (Šrol, Čavojová, et al., 2021). Clearly, conspiracy belief in the case of COVID-19 can have far-going social consequences for both the conspiracy believers as well as society as a whole. Hence, COVID-19 conspiracy believe poses a danger to society.

Various reasons for believing conspiracy theories are known, both demographics and psychological factors can play a role (Douglas et al., 2019). Conspiracy believers are more likely to be male and unmarried, are usually less educated and have a lower income, while also believing to have a lower social standing as compared to others (Freeman & Bentall, 2017). Furthermore, conspiracy believers are prone to be less healthy, both physical and psychological (Freeman & Bentall, 2017). Other psychological factors that can influence conspiracy belief are uncertainty reduction, gathering knowledge and self-image, although people might not be consciously aware of this (Douglas et al., 2019). The previously mentioned factors contributing to conspiracy belief are individual, although there is also a social factor influencing conspiracy belief (Douglas et al., 2019).

Social context can greatly influence conspiracy belief, as people want to feel good about themselves and the groups they are in (Sternisko et al., 2020). This can be seen as part of the social identity theory, which states that the groups people are in can be used to build up one's self-esteem (Kassin et al., 2016). Group-forming is an important theme, because many conspiracy theories emerge due to tensions between groups, which are also sustained by these theories (Douglas, 2021). This social motive can also be seen on social media, were groups are formed as well.

Social media facilitate the fast dissemination of misinformation (Limaye et al., 2020), so they seem to help with spreading conspiracy theories. Even though social media facilitate the spread of conspiracy theories, they do not necessarily increase the amount of conspiracy theories (Douglas et al., 2019). Especially Twitter contributes to the spread of conspiracy theories, among other factors it is easy to multiply content and to cooperate with each other on Twitter (Monaci, 2021). In the case of COVID-19, there was a lot of uncertainty. When correct and precise information is absent,

misinformation is more easily diffused (Modgil et al., 2021) which again causes heightened chances of contracting COVID-19 (Moore et al., 2021). As such, the lack of precise information about COVID-19 contributes to the spread of conspiracy theories. As well as the easy spread of misinformation regarding COVID-19 on social media.

One Twitter user believing in COVID-19 conspiracy theories and contributing to the spread of them in combination with misinformation might not seem to alarming. However, one user can play a key role in dissemination of a conspiracy theory. For example, single Twitter accounts dedicated to spreading a conspiracy theory can form large networks with hundreds of other users (Ahmed et al., 2020). This makes one wonder what type of information regarding the COVID-19 conspiracy theories is discussed and what kind of people contribute to the spread of COVID-19 conspiracy theories. Demographics and social psychological motives are known for general conspiracy beliefs, which appear to be fitting for COVID-19 conspiracy beliefs as well. However, little is knows about the effects of believing in different types of COVID-19 conspiracy theories. Currently, most research focusses on COVID-19 conspiracy belief in general while not distinguishing between the different types of theories (e.g., Soveri et al., 2021; Sternisko et al., 2021). Additionally, most research focusses on individual COVID-19 conspiracy believers or COVID-19 conspiracy believers as a whole on social media. This leaves out the groups people form when interacting with each other on social media and results in the following research question:

What are the characteristics of the communities in which COVID-19 conspiracy theories are discussed on Twitter?

To analyse the different types communities regarding COVID-19 conspiracy belief, multiple steps have been taken. In the following chapter, literature has been consulted to establish a theoretical framework regarding COVID-19 conspiracy belief and its causes, distinguishing distinctive COVID-19 conspiracy theories. Factors influencing COVID-19 conspiracy belief and the effect Twitter has on this conspiracy belief are inspected as well. Then, an overview will be given on how the topic analysis and network analysis have been executed to gain results regarding the communities in which COVID-19 conspiracy believers interact on Twitter. In the next chapter, these results are discussed and explained while embedded in the social context. Lastly, a discussion of the results will provide clarity on the meaning of the results in the bigger picture of COVID-19 conspiracy belief, while also discussing the implications for future research and limitations of this research.

2. THEORETHICAL FRAMEWORK

In this theoretical framework, an overview regarding COVID-19 conspiracies and the groups of people talking about them is given. Topics regarding conspiracy belief, different COVID-19 conspiracy theories and motivations for believing in COVID-19 conspiracy theories are discussed. Different motives exist, such as demographics and social psychological motives. These motives also manifest themselves on social media and Twitter in particular. Twitter offers different dimensions in which COVID-19 theories can be spread and which can contribute to COVID-19 conspiracy belief. Lastly, an overview will be given on how COVID-19 conspiracy theories, believing them and their spread are likely to be embedded on Twitter.

2.1   COVID-19 CONSPIRACY THEORIES: JUST LIKE OTHER CONSPIRACIES

For one person, conspiracy theories are just what they seem to be: false counterplots, conspiracies. However, for another person they are not mere theories, they are the truth. Conspiracy theories interest people and reduce the attention on official justifications (Douglas et al., 2016). Usually, they are seen in two manners: as the most probable scenario by the people who believe in it and as the least probable scenario by the people who do not believe in it (Gjoneska, 2021). In definition, conspiracy theories are "attempts to explain the ultimate causes of significant social and political events and circumstances with claims of secret plots by two or more powerful actors" (Douglas et al., 2019, p. 4).

The European Commission (n.d.) specifies six similarities between conspiracy theories more precise than explaining social and political events. These six common aspects include: : 1) *An alleged, secret plot*, 2) *A group of conspirators*, 3) *'Evidence' that seems to support the conspiracy theory*, 4) *Falsely suggesting that nothing happens by accident and that there are no coincidences while nothing is as it appears and everything is connected*, 5) *Dividing the world into good or bad*, 6) *Scapegoating people and groups* (European Commission, n.d.). These six aspects are also present among the COVID-19 theories. For example, the government can be seen as an actor with bad intentions, resulting in the COVID-19 conspiracy believers creating an "us-versus-them" narrative, in which they see the government as a threat. In line with COVID-19 conspiracy theories adhering to the six aspects of conspiracy theories, believing in COVID-19 conspiracy theories highly correlates with conspiracy mentality and believing in specific conspiracy theories (Gligorić et al., 2021). This implies that COVID-19 conspiracy belief is, in essence, the same as any other conspiracy belief.

COVID-19 conspiracy theories are set apart from other conspiracy theories by their specific content related to COVID-19. Scholars have distinguished and divided the different COVID-19 conspiracies into types and various categories. Imhoff and Lamberty (2020) distinguished two types of COVID-19 conspiracy theories: COVID-19 being manmade or it being a hoax. Building further on this distinction, Gerts et al. (2021) stated that the COVID-19 being manmade theories can be divided over four categories: 1) 5G is related to COVID-19, 2) Bill Gates is related to COVID-19, 3) COVID-19 was created in a lab, and 4) the COVID-19 vaccine is harmful. Although these categories give an indication of the different COVID-19 conspiracy theories, these categorizations have their limitations.

The two categories from Imhoff and Lamberty (2020) are too general because it does not distinguish different types COVID-19 conspiracy theories that are manmade, such as a connection with either Bill Gates or the government. On the other hand, the categories from Gerts et al. (2021) missed a category in which COVID-19 is considered to be a hoax and can therefore not give a complete overview when missing information. For this research, both approaches were combined into the following categorization : 1) *COVID-19 is a hoax/exaggerated,* 2) *COVID-19 is manmade,* 3) *Vaccine related theories,* 4) *5G related theories,* 5) *COVID-19 as a way to control.* An overview of the particular COVID-19 conspiracy theories per category that were taken into account for the corpus selection of this research, can be seen in Table 1.

The categories of the COVID-19 conspiracy theories and the many different COVID-19 conspiracy theories show that there might be differences among COVID-19 conspiracy believers. The type of COVID-19 conspiracy theories also influences how one deals with COVID-19, for example when COVID-19 is considered to be a hoax one is less inclined to follow the COVID-19 measures while considering COVID-19 to be manmade made one more likely to engage in preventative behaviours (Chan et al., 2021). Hence, differences in COVID-19 conspiracy belief can influence behaviour one engages in. This raises the following sub-question:

Which COVID-19 conspiracy content is discussed in the communities on Twitter?

Table 1

Overview of the different COVID-19 conspiracy theories

Category	Subcategory	Conspiracy theory	Source
COVID-19 is a hoax/exaggarated	*Hoax*	COVID-19 does not exist, it is a hoax	(Gruzd & Mai, 2020; Imhoff & Lamberty, 2020)
	Exaggeration	COVID-19 is no worse than the flu	(Imhoff & Lamberty, 2020; Wirawan et al., 2021)
		The government intentionally makes COVID-19 seem like a bigger deal than it is	(Wirawan et al., 2021)
		The government intentionally makes COVID-19 seem more dangerous than it is	(Wirawan et al., 2021)
		COVID-19 is not as deadly as the picture painted	(Wirawan et al., 2021)
		The media intentionally make COVID-19 seem like a bigger deal than it is	(Wirawan et al., 2021)

COVID-19 is manmade	General	COVID-19 is manmade	(Wirawan et al., 2021)
	Bioweapon	COVID-19 is a bioweapon	(van Mulukom et al., 2020; Wirawan et al., 2021)
		COVID-19 is a bioweapon created by Bill Gates*	(Shahsavari et al., 2020)
		COVID-19 is a bioweapon that reacts to 5G*	(Shahsavari et al., 2020)
	Created in a Lab	COVID-19 is created in a lab in China to inflict a war between the USA and China*	(Douglas, 2021)
		COVID-19 was created in a lab to hinder the re-election campaign of Donald Trump*	(Douglas, 2021)
		COVID-19 was created in a lab in China	(Douglas, 2021; Shahsavari et al., 2020)
Vaccine related theories		There are microchips in the vaccine	(Gerts et al., 2021; van Mulukom et al., 2020)
		COVID-19 is a scheme to impose vaccination on everyone*	(Wirawan et al., 2021)
		COVID-19 medicine and vaccines exist already but are hidden away	(Wirawan et al., 2021)
5G related theories		COVID-19 is linked to 5G	(Gerts et al., 2021; van Mulukom et al., 2020)
		COVID-19 is caused by 5G	(Wirawan et al., 2021)
		5G causes damage to the immune system after which it caused the COVID-19 pandemic	(Budryk, 2020, as cited in Mourad et al., 2020)
		5G enables the spread of COVID-19	(van Mulukom et al., 2020)
COVID-19 is a way to control	Bill Gates	COVID-19 is a bioweapon created by Bill Gates*	(Shahsavari et al., 2020)

		COVID-19 being linked to Bill Gates	(Gerts et al., 2021; van Mulukom et al., 2020)
	Government	The government uses COVID-19 to get more power	(Wirawan et al., 2021)
		COVID-19 is used to gain political control	(van Mulukom et al., 2020)
		COVID-19 is a scheme to impose vaccination on everyone*	(Wirawan et al., 2021)
		COVID-19 is created in a lab in China to inflict a war between the USA and China*	(Douglas, 2021)
		COVID-19 was created in a lab to hinder the re-election campaign of Donald Trump*	(Douglas, 2021)
	Other	Healthcare workers financially profited from the pandemic	(Wirawan et al., 2021)

*starred theories fit into multiple categories.

2.2   FACTORS CONTRIBUTING TO CONSPIRACY BELIEF

To research different communities in which COVID-19 conspiracy belief is discussed, it is essential to understand who COVID-19 conspiracy believers in those communities are and what drove them to COVID-19 conspiracy belief. Conspiracy belief is mainly influenced by demographics and social psychological motives (Douglas et al., 2019). While the demographics are a given per person and can be seen as individual characteristics, the social psychological motives explain contextual reasons of why someone is more likely to believe in conspiracy theories. It can even be said that these motives drive conspiracy belief (Douglas et al., 2019). First, the demographics that contribute to general conspiracy belief and COVID-19 specific conspiracy belief will be discussed. Secondly, the social psychological motives that can drive conspiracy belief will be explained and examined in-depth. The demographics and social psychological motives describe the COVID-19 conspiracy believers and the underlying aspects of COVID-19 conspiracy belief, which can be used to understand conspiracy communities.

2.2.1   Demographics

Multiple demographics play a role in conspiracy belief. Being unmarried and male heightens chances for conspiracy belief (Freeman & Bentall, 2017). Other factors influencing conspiracy belief are lower household income (Freeman & Bentall, 2017) and lower education (Buturoiu et al., 2021; Freeman & Bentall, 2017). The latter was also found in studies on COVID-19 specific conspiracy belief, as well as lower age (Duplaga, 2020), which was not a significant factor contributing to general conspiracy

belief (Freeman & Bentall, 2017). Furthermore, conspiracy believers are more likely to believe that they have a lower social standing than others (Freeman & Bentall, 2017).

Political orientation is also a determinant for conspiracy belief and relates to conspiracy beliefs involving political events. People on the right-wing of the political spectrum are more prone to support conspiracy theories (Furnham, 2021). In the context of COVID-19, an example is seen among the Donald Trump supporters who were more hesitant about the COVID-19 vaccine while being more prone to believe in conspiracy theories (Hornsey et al., 2020). With these political aspects in mind, it is possible that right-wing conservative politics and politicians are a topic of discussion among Dutch COVID-19 conspiracy believers as well. Furthermore, In the European Union (EU), people endorsed conspiracies theories more when they thought their country had not benefitted from the EU and were more sceptical towards the COVID-19 pandemic (Gemenis, 2021). Therefore, the EU and other overarching international organizations might also be discussed among the COVID-19 conspiracy theories.

Although demographics are not directly displayed on people's Twitter account or used to distinguish communities, it is important to understand who the COVID-19 conspiracy believers are to explain some of the content. Especially political engagement might be useful to explain political content and characteristics in communities, as conspiracy theories are inherently entangled with politics. This results in the following sub-question:

Which types of political perceptions can be found in communities concerning COVID-19 conspiracy theories?

2.2.2 Social psychological motives

Besides demographics of conspiracy believers, specific social psychological motives have been found that influence people's conspiracy belief. Douglas et al. (2019) explain three social psychological motives: epistemic, existential and social motives. Similarly to these three motives, Sternisko et al. (2020) mention three main motivations to believe in conspiracy theories: making sense of one's environment, feeling safe and in control, and feeling good about oneself and the groups one is in. Based on the abovementioned motives, this study addresses sensemaking, perceived control, and social identification.

Reason 1: Sensemaking

The first motive to explain conspiracy belief is sensemaking. Sensemaking relates to the epistemic motive (Douglas et al., 2019) and the motivation to make sense of one's environment (Sternisko et al., 2020). Conspiracy theories are likely to emerge in crisis situations (van Prooijen & Douglas, 2017), as is the case with the COVID-19 pandemic. Crisis situations give rise to conspiracy belief because the believer's emotional needs, such as making sense of their environment, are not met (Douglas, 2021). People who are seeking for certainty and/or significance can be drawn towards conspiracy theories as an answer of how situation occurred (Douglas, 2021; Douglas et al., 2019), especially

when they do not possess the cognitive tools to comprehend the rational manners and cannot find certainty via any other way than conspiracy belief (Douglas et al., 2019). It can be said that "conspiracy theories offer simple answers to complex problems by providing explanations for uncertain situations" (Marchlewska et al., 2018, p. 109). This can be linked to lower education (Buturoiu et al., 2021; Freeman & Bentall, 2017) as well as conspiracy believers having a lower analytical thinking style (Gligorić et al., 2021). This motive can partly explain the emergence of conspiracy theories regarding COVID-19, which can help to understand why COVID-19 conspiracy community members might believe in the COVID-19 conspiracy theories.

Reason 2: Perceived control

The second motive to believe in conspiracy theories is perceived control. It relates to the existential motive (Douglas et al., 2019) as well as feeling safe and in control (Sternisko et al., 2020) and conspiracy belief being used to regain control (Douglas et al., 2019). People who perceive a lack of control can resort to conspiracy belief because of the uncertainty (Douglas, 2021), a high level of threat (Heiss et al., 2021) to either society or the role one has in society (Federico et al., 2018), or stressful life events (Swami et al., 2016). In the COVID-19 pandemic, uncertainties are especially high and people are anxious (Douglas, 2021). Such a crisis situation can lead to feelings of uncertainty and people believing they lost control over the situation (van Prooijen & Douglas, 2017). In short: a perceived lack of control can cause people to believe in COVID-19 conspiracy theories (Šrol, Ballová Mikušková, et al., 2021).

A perceived lack of control can be divided into two types: structural and incidental. Structural relates to feeling noninfluential over political issues whereas incidental is about distressing occurrences which reduce the perceived control one has over their fate (Van Prooijen, 2018). Both types are incited by the COVID-19 pandemic. An incidental perceived lack of control happens incidentally and is due to having no control over the COVID-19 situation in this case. The perceived structural lack of control is due to the emergence ordinances and emergency laws instituted in terms of crisis. Conspiracy belief can be used to cope with a perceived lack of structural control, because the believer can reject the narrative from the government and other authorities (Douglas et al., 2019). As such, the structural lack of control suggests that the government narrative is dismissed among COVID-19 conspiracy believers.

Reason 3: Social identification

The third and last social psychological motive for believing in general conspiracy theories, and thus also the COVID-19 conspiracy theories, is the social one. The social motive of believing in conspiracy theories is about enhancing one's self-esteem by belonging to certain groups, which is explained by the social identity theory. Priante et al. (2016) explain the social identity theory as "an individual's self-definition based on social roles played in society or memberships of social groups" (p. 56). Conspiracy beliefs can become part of one's identity. For people who reject science it was found that anti-science beliefs can be inherently entangled with the identity of a group. Starting to believe into the scientific consensus would even mean turning down the group (Hornsey, 2020). Additionally,

it was found that when someone perceived their identity as Muslim very important, this could lead to a perceived threat from the outgroup as well as collective angst, resulting in a heightened belief in conspiracy theories (Mashuri & Zaduqisti, 2015). Thus, believing in COVID-19 conspiracy theories can both fuel one's social identity as be fuelled by one's social identity, resulting in perceiving non-conspiracy believers to be a threat.

In a group, conspiracy theories can be used as explanations. Conspiracy theories can be used to defend one's ingroup and its actions (Chayinska & Minescu, 2018), to explain a lower status of a group (van Mulukom et al., 2020), act as a buffer against criticism on the ingroup (van Mulukom et al., 2020), and to explain events from the ingroup to get the group validated by outgroups (Douglas et al., 2019). However, collective narcissism can appear as well in groups. In collective narcissism the individual feeling of superiority broadens to include an amplified sense of superiority among one's ingroup and it positively predicts acceptance of COVID-19 conspiracy theories (Magarini et al., 2021). An example of collective narcissism that positively predicts COVID-19 conspiracy belief is national narcissism, which is considering one's country to be really great (Sternisko et al., 2021). Conspiracy belief seems to be a result from the groups ideology, when perceiving the group as less than other groups it is used as an explanation while conspiracy belief can also be a result from the group feeling superior.

The social psychological motives explained reasons for and factors contributing to COVID-19 conspiracy belief. The sensemaking and perceived control are themes recognizable in the COVID-19 pandemic, due to COVID-19 being a sudden crisis. Social identification on the other hand is an important process for online communities, because the extended usage of social media facilitates online group forming. This brings online social identities into play, which are "self-concepts that result through identification with social groups or categories that individuals experience online" (Pegg et al., 2018, p. 51). These online social identities can affect online communities, as it influences both people's online behaviour and can cause people to contribute to virtual communities (Tsai & Bagozzi, 2014). Online social identities make online social identification a key factor in the communities surrounding COVID-19 conspiracy belief. In combination with conspiracy belief possibly becoming part of one's social identity, this results in the following sub-question:

To what extent is COVID-19 conspiracy belief included in social identity?

2.3   TWITTER: THE CONSPIRACY INCUBATOR

The presence of social identity on social media and its influence on social interactions concerning COVID-19 conspiracy theories is considerable. Multiple aspects of social media platforms, and Twitter especially, can contribute to the spread of conspiracy theories such as multiplying content easily and cooperation with others being prevalent (Monaci, 2021). Additionally, content moderation regarding conspiracy theories on Twitter is not as accurate as for other platforms (Papakyriakopoulos et al., 2020), resulting in COVID-19 conspiracy theories being spread easily. A single Twitter account can already contribute greatly to the spread of a COVID-19 conspiracy theory (Ahmed et al., 2020).

However, conspiracy theories are not only disseminated by people who believe in them, they are also disseminated by people who make fun of these theories and their believers. This is called the humour effect, which describes that people who mock a conspiracy on Twitter draw attention to it, thereby contributing to its spread (Ahmed et al., 2020).

Twitter also allows for polarization. Tweets regarding COVID-19 conspiracy tweets can be linked to this polarization, as conspiracy theories are usually surrounded by hateful content which adds to polarization (Monaci, 2021). Furthermore, the conspiracy environment on Twitter is very polarized and disputes emerge frequently (Monaci, 2021). Polarization is often linked to politics, which is connected to COVID-19 conspiracy belief considering political orientation is a determinant for COVID-19 conspiracy belief as mentioned earlier. On Twitter, accounts that frequently share misinformation often also share tweets in line with conspiracy theories, which are regularly politically charged (Muric et al., 2021). Politicians even tweet about conspiracy theories, conservative politicians and right-wing activists were even found to be the driving force behind the spread of COVID-19 being a hoax conspiracy theories (Gruzd & Mai, 2020). In short, political topics contribute to the spread of COVID-19 conspiracy theories on Twitter, which can cause polarization. It is expected to see polarization in the communities regarding COVID-19 conspiracy theories in combination with politics as well.

In addition to these features of Twitter that contribute to the spread of COVID-19 conspiracy theories and forming of communities around the conspiracy theories, some other phenomena enable conspiracy dissemination and community forming on Twitter as well. Identity bubbles sum up three phenomena people are likely to encounter when they are active on social media: the information bias, homophily and social identification. Social identification has been explained among the social psychological processes already. The other two phenomena, the information bias and homophily, are described below.

2.3.1   Information Bias

The information bias is about encountering information within one's previous line of thinking and opinions in combination with the impression that information on social media is trustworthy (Kaakinen et al., 2020). It manifests itself in two ways: the confirmation bias and the filter bubble. The confirmation bias can be summed up as the tendency to look for information that is in line with ones line of thinking (Brugnoli et al., 2019). The filter bubble on the other hand, refers to algorithms from search engines, news aggregators or social media, that automatically show or suggest content similar to what a person believes in or agrees with (Flaxman et al., 2016). This can create an vicious circle of encountering similar information. In the case of COVID-19, (mis)information regarding COVID-19 is shared and found on social media, allowing it to end up in the filter bubbles. The result of being exposed to a lot of fake news about COVID-19 vaccination can be trusting the COVID-19 conspiracy theories more (Buturoiu et al., 2021), essentially leading to more COVID-19 conspiracy belief.

The fake news and misinformation regarding COVID-19 were very present on Twitter and social media. The amount of information present caused social media to contribute to an "infodemic": an overabundance of information, including false information in the light of a disease (Demuyakor et al., 2021; Magarini et al., 2021). Without a real scientific and governmental consensus on how to deal with the COVID-19 virus, people seem to use social media to share their thoughts and solutions (Shahsavari et al., 2020). The information that these people spread is not always correct, as not everyone on Twitter sharing information regarding COVID-19 has relevant qualifications and knowledge (Mourad et al., 2020). Eventually, the absence of correct information can even cause misinformation to diffuse (Modgil et al., 2021). In the information bias on social media and Twitter, people deem the information that is spread to be reliable (Kaakinen et al., 2020). The more trust one has in posts on social media related to COVID-19, the more likely one is to belief in COVID-19 conspiracy theories (Ejaz et al., 2021). To sum up the information bias on Twitter, the users are constantly confronted with the same type of information, which can contribute to COVID-19 conspiracy belief when the information concerns COVID-19 conspiracy theories or misinformation.

2.3.2   Homophily

In addition to the similar information people encounter on Twitter, people might also encounter users with similar opinions and beliefs which is explained by homophily. Homophily describes that people are more likely to interact with like-minded others (Kaakinen et al., 2020). It comes forward in echo chambers, where people are mostly confronted with similar opinions to their own (Flaxman et al., 2016) while contrasting opinions are rejected (Risius et al., 2019). Echo chambers are also expected among the COVID-19 conspiracy believers, as COVID-19 conspiracy belief can become part of the social identity of the ingroup. Conspiracy believers and people who perceive themselves as a minority are more likely to engage in homogenous networks because they prefer the like-minded interactions (Röchert et al., 2021), showing that these ingroups prefer interactions within their group. On the other hand, people disputing conspiracy theories interact in more heterogenous networks (Röchert et al., 2021) and it is expected that people who come into contact with information from different contexts and different points of view are less likely to belief in conspiracy theories (Magarini et al., 2021). People perceive information from their social network, their ingroup, to be more trustworthy (Kaakinen et al., 2020), which can explain why the echo chambers in a network can contribute to COVID-19 conspiracy belief. As such, it is expected that COVID-19 conspiracy believers form echo chambers and predominantly interact with their ingroup.

The information bias and homophily are both expected to contribute to the forming and maintaining of communities concerning COVID-19 conspiracy theories on Twitter. Additionally, the homophily and information bias can explain what is happening and communicated in a community. Thus, the following sub-question is asked:

To what extent are the information bias and homophily present in the different communities concerning COVID-19 conspiracy theories?

2.4   CONCEPTUAL FRAMEWORK

The reviewed literature has presented a few concepts that can help to answer the research question regarding the characteristics of the communities concerning COVID-19 conspiracy theories, resulting in four sub-questions. The first, "*which COVID-19 conspiracy content is discussed in the communities on Twitter?*", aims to give an overview of the types of COVID-19 conspiracy content in the communities, which can be compared to one another. The second sub-question, "*which types of political perceptions can be found in communities concerning COVID-19 conspiracy theories?*", is proposed to gain an overview of different or similar political views within or between communities. The third sub-question, *"to what extent is COVID-19 conspiracy belief included in social identity?"*, is asked to gain an overview of to which extent social identification is happening within the communities. The fourth and last question is *"to what extent are the information bias and homophily present in the different communities concerning COVID-19 conspiracy theories?"* This final sub-question aims to review the homophily and information biases within the communities, to unravel which types of people make up the community. Eventually, the answers to these sub-questions can contribute to finding different characteristics of communities concerning COVID-19 conspiracy theories.

3. METHODS

The aim of this research is to discover the spread and interaction regarding COVID-19 conspiracy theories in networks and social circles on Twitter. To do this, a data analysis has been executed existing of two parts: a general data analysis and a network analysis. To start off, aspects of the data analysis are reviewed upon in section 3.1. Then, the corpus selection and data preparation can be found in section 3.2. Tweets regarding the COVID-19 vaccine were gathered after which a selection was made of tweets that referred to COVID-19 vaccine conspiracy theories. The specific details can be found in section 3.2.1. Afterwards the data was prepared for analysis in R, version 4.1.2, an open source coding language suitable for statistical analysis. Details on this process are documented in section 3.2.2. The analyses executed were a general analysis and a network analysis, which can be found in section 3.2. For the general analysis, the tweets per day and the hashtag usage were analysed as can be read in section 3.3.1. In the network analysis, communities were detected and the tweets per day, five most important users, hashtags and word analysis were reviewed. To gain a more in-depth understanding of the communities and circles that conspiracy believers operate in, a few of these communities were analysed in-depth. The details on the different methods for the network analysis can be found in section 3.3.2. An overview of the whole research process can be seen in Figure 1.

Figure 1

General overview of the data preparation and data analysis phase.
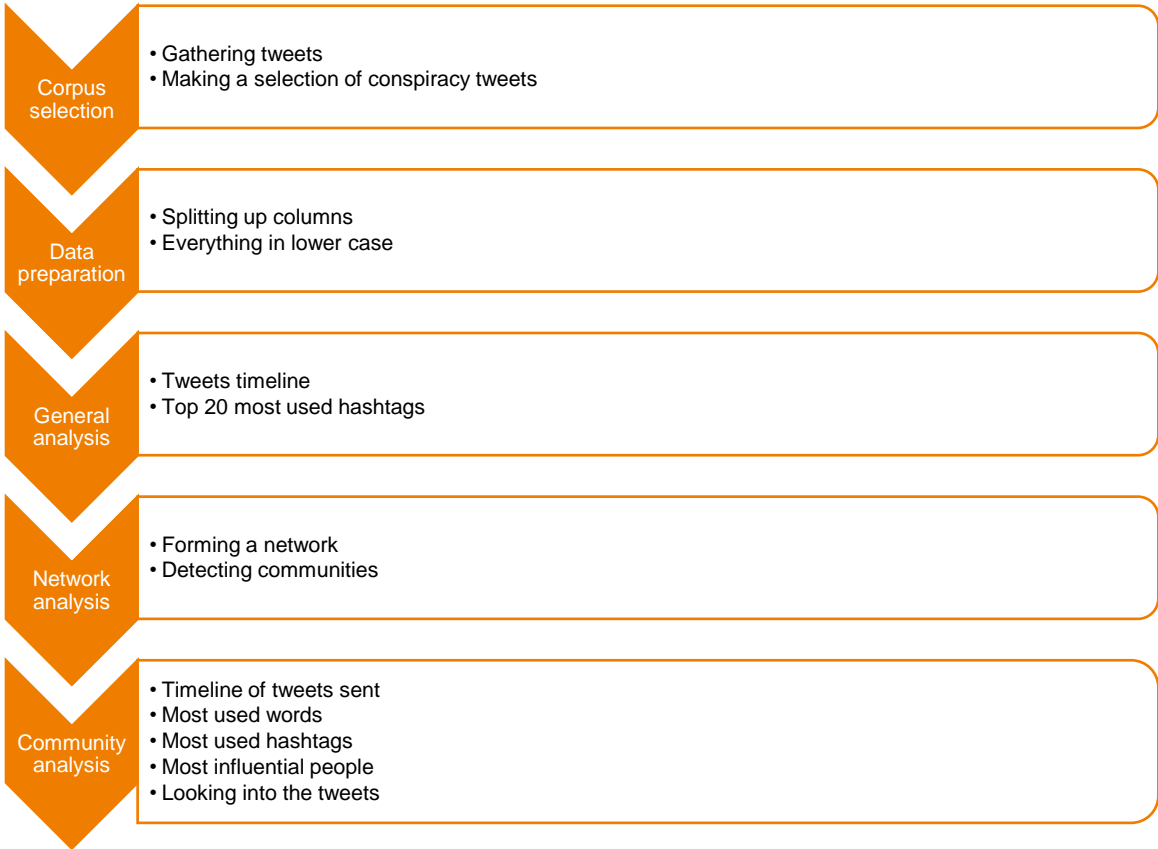
3.1   RESEARCH DESIGN

The input for this data analysis were tweets about COVID-19 conspiracy theories. Twitter was the social medium of choice because conspiracy theories spread well on it and the data was accessible while mostly containing text. As such, Twitter data could be analysed well and was effective for creating networks, which are the input for community detection.

This research made use of a large dataset, which made the results more generalizable. This is due to large datasets causing random sampling and other statistical methods to become redundant (Esfahani et al., 2019). A large data set was useful, because it helped with exploring hidden structures among and between the communities, it even allowed for finding common features among the communities while there were many differences between them (Fan et al., 2014). A downside of the use of Twitter data for this research is that data from people who do not use Twitter is not available (Esfahani et al., 2019), causing their point of view not to be included. Furthermore, large datasets such as the one used often contains some forms of missing data or measurement errors, as well as outliers or missing values (Fan et al., 2014), for example missing the date on which the tweet was sent. In this research, the Twitter data allowed for a general overview of the Dutch conspiracy networks and communities on Twitter, as data from all discourse regarding COVID-19 conspiracy theories was included.

3.2   DATA COLLECTION AND PREPARATION

In this section, the data collection and the selection of the corpus is summarized and the data preparation is discussed.

3.2.1   Corpus selection

The corpus for this research consisted of tweets sent out in the year 2020, the first full year in which COVID-19 spread over the world. A sample of Dutch tweets sent between the 3rd of January 2020 and the 19th of January 2021 was gathered. This was done by using search words in combination with search strings (see Table 2), to ensure that the tweets included were about the COVID-19. Only tweets that contained some of the search strings, as can be seen in table 2, in combination with either *"corona", "covid", "cov-2"* or *"covid19"* were included. Duplicate tweets and retweets were excluded, as those would not provide any new or additional information. It was impossible to know if all tweets regarding COVID-19 conspiracy theories sent between the 3rd of January 2020 and the 19th of January 2021 were included, therefore it must be said that a sample was collected. In total, this initial selection of tweets resulted in 541294 tweets being gathered.

Table 2

Search strings used to gather tweets

Group	Search Query

1	vaccin OR vaccinatie OR vaccineren OR vaccins OR oxfordvaccin
2	viruswaanzin OR Vaccinscam OR Coronascam OR Coronaleugens OR covidhoax OR Vaxplicht OR Tweedegolf OR noodwet
3	covid+vaccin OR covid_19vaccin OR sars-cov-2 OR vaccintegenCOVID19 OR coronavaccinNL OR vaccinatiecorona OR Vaccintegencorona OR vaccincorona_nl OR coronavaccin_nl OR Covid-19vaccin OR Coronavaccin OR Covidvaccin OR Covid19vaccin OR Ikvaccineer
4	Coronamaatregelen OR Samentegencorona

From the initial gathered tweets, a selection of conspiracy tweets was made. The bag of words approach was used to select conspiracy tweets by means of search words. The list of search words can be found in Table A1 in Appendix A. The search words were selected based on reviewing a sample of 247 tweets that were related to COVID-19 conspiracy theories. Interesting, common, and conspiracy related words found in those tweets were used as search words, as well as words that described specific COVID-19 conspiracy theories. Both the tweets and the search words were put into lower case letters to ensure that no differences in capital letters existed. Eventually, a sample of 84,655 tweets regarding COVID-19 conspiracy theories was selected (see Figure 2), which were sent by 17,099 distinct users.

Figure 2

Visualization of the corpus
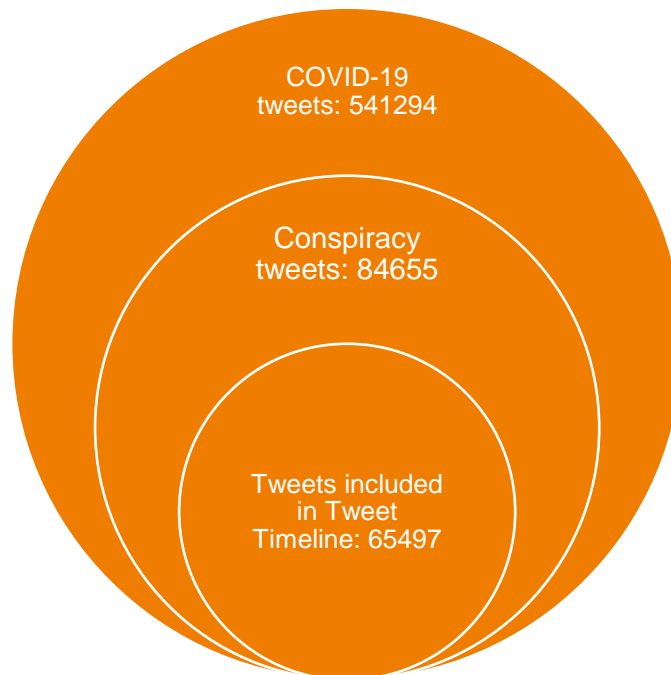
3.3   DATA ANALYSIS

For the analysis of the data, the tweets and their metadata were used. Examples of the metadata in the sample of tweets are data regarding when the tweet was sent, user ID's, who are mentioned, who the user replied to and which hashtags were used. This metadata was useful for the topic analysis and the network analysis. The topic analysis mainly made use of the hashtags and the dates tweets were sent, whereas the network analysis made use of which users the writer of the tweets mentioned or replied to. The other metadata was used to give an overview of the different communities. In this section, the topic analysis is discussed first followed by an explanation of the set-up of the network analysis.

3.3.1   Topic analysis

The topic analysis was executed to create an overview of the discourse in the COVID-19 conspiracy tweets. To do so, an analysis regarding the timeline of the tweets sent was executed and an overview of the amount of tweets sent per day was created. For this, the dates on which the tweets were sent were used. To create this overview the *rtweet* package (Kearney et al., 2020) has been used.

In addition to the timeline of the tweets, a hashtag analysis had been executed to gain insight to get a general overview of the topics of discussions in the corpus. The hashtag analysis focussed on the most used hashtags in the sample of COVID-19 vaccine conspiracy theory tweets. All tweets and hashtags were transformed into lower case text, to ensure that differences in the use of capital letters did not lead to different results. This means that the hashtag "COVID" is considered the same as the hashtags "covid", "Covid" and "COviD" for example. To utilize the data, the package *rtweet* was used. A table, wordcloud, and barplot containing the 20 most used hashtags in the sample of tweets were produced with the *wordcloud* (Fellows, 2018) package.

3.3.2   Network analysis

The second part of the research focussed on a network analysis, which can help to interpret the social circles conspiracy believers are occupying as well as the social interactions they have. This analysis was based on Twitter users mentioning and replying to each other, as a network was formed based on this information. A network like this, built based upon mentions and replies, focusses on the interactions that are formed in the network (Leavitt et al., 2009), which can help to explain the similarities and differences between communities in which COVID-19 conspiracy content is shared. The nodes in the networks were the Twitter users sending out tweets or being replied to, the edges consisted of the tweets. Retweets were not included in the network, which ensured that included connections were only people explicitly mentioning each other. Essential packages for building the network were *ggplot2* (Wickham, 2016), *igraph* (Csardi & Nepusz, 2006), and *vosonSML* (Graham et al., 2020).

Part of the network analysis was the community analysis. Communities were sub-networks in the larger network which were examined more into depth. Users in the same community usually have similar characteristics and information spreads easily while there is limited interaction across

communities (Schmitt et al., 2018). The fast greedy method, based upon a proposed algorithm from Clauset et al. (2004), was used to detect the different communities. Because these type of methods for clustering deliver results fast (Bakhthemmat & Izadi, 2021) they are suitable for large datasets. The fast greedy method was a function of the *igraph* package and worked by optimizing the modularity in order to find close links to detect communities. The agglomerative hierarchical clustering method combined combinations of communities for larger communities to be generate (Bakhthemmat & Izadi, 2021). As such, communities with tight links could be generated. For this research, the multiple communities detected were the input to gain information regarding their different characteristics.

To understand the communities better and retrieve their characteristics, multiple steps were taken. For each community, the tweets in the community and other tweets in the conspiracy tweets sample by users from the community were included. With the data of each community, a hashtag and word analysis were done. Furthermore, the five most important users were determined for each community and a timeline of the amount of tweets sent per day was made.

4. RESULTS

In this chapter, first the analysis of the conspiracy tweets is discussed and second the network analysis is discussed. Regarding the conspiracy tweets, the results concerning the timeline in which the tweets were sent and the topics present in the corpus are elaborated on. For the network analysis, a general examination of the network is discussed followed by the community analysis based on in-depth analysis of nine communities.

4.1   COVID-19 CONSPIRACY TWEETS

To get an overview of the discourse in the COVID-19 conspiracy tweets throughout the pandemic, an analysis of the amount of tweets sent per day was executed in combination with a hashtag analysis.

4.1.1   Tweet Timeline

To create an overview of the amounts of tweets sent per day a sample of 65497 tweets was used, because these tweets could be connected to a specific day (see Figure 2). In Figure 3, the days on which more than 500 tweets were sent are indicated with a red dot. The most tweets sent in one day were 3044 tweets, sent on the 27th of June. This spike in the number of tweets also encompasses the spikes from the 25th, 26th, and 28th of June. Many tweets being sent that day had to do with a protest against the COVID-19 measures planned for the 28th of June on the Malieveld by action-group Viruswaarheid. This protest had been banned on the 26th of June by the major of the Hague (Nederlandse Omroep Stichting, 2020c) as the safety of people could not be guaranteed, due to people not being able to keep distance from each other. Viruswaarheid did not agree with this, asking for a summary judgement to see if a judge would lift the ban. The judge however did not, banning the protest once again on the 27th of June (Nederlandse Omroep Stichting, 2020f). In the tweets, people often mention Viruswaarheid and/or the protest by agreeing with them or being against their ideas. Additionally, political ideas are often found as well due to people demanding the prime minister among others to resign.

A week earlier, on the 21st of June, Viruswaarheid also had a protest planned on the Malieveld against the COVID-19 measures. This protest had been banned as well by the major and a judge in a summary judgement. Still, people protested resulting in 400 people being arrested (Nederlandse Omroep Stichting, 2020d). These events explain the spike in the number of tweets on the 21st of June. The majority of the tweets of this day referred to Viruswaarheid and/or the protest.

Another spike in the number of tweets sent was seen on the 7th of July. In a news article from the same day it was reported that Viruswaarheid lost the summary judgement case they started regarding the judge on their case of halting all COVID-19 measures to be biased, meaning the judge was considered not biased (Nederlandse Omroep Stichting, 2020g). In the tweets itself no coherent theme was discovered, except for Viruswaarheid being discussed in almost all tweets.

Lastly, a spike is visible on the 20th of August. This day, the police arrested eight protesters who were protesting against the COVID-19 measures in the Hague because they acted aggressively

and provocatievely against the police. Willem Engel stated that the protest had not been related to Viruswaarheid (Nederlandse Omroep Stichting, 2020a). In the tweets, Viruswaarheid and the police were recurring topics, referring to the arrests made in the Hague.

Figure 3

Number of tweets per day

Numbers of tweets per day
2020-01-04 to 2021-01-19

Total number of tweets: 65497
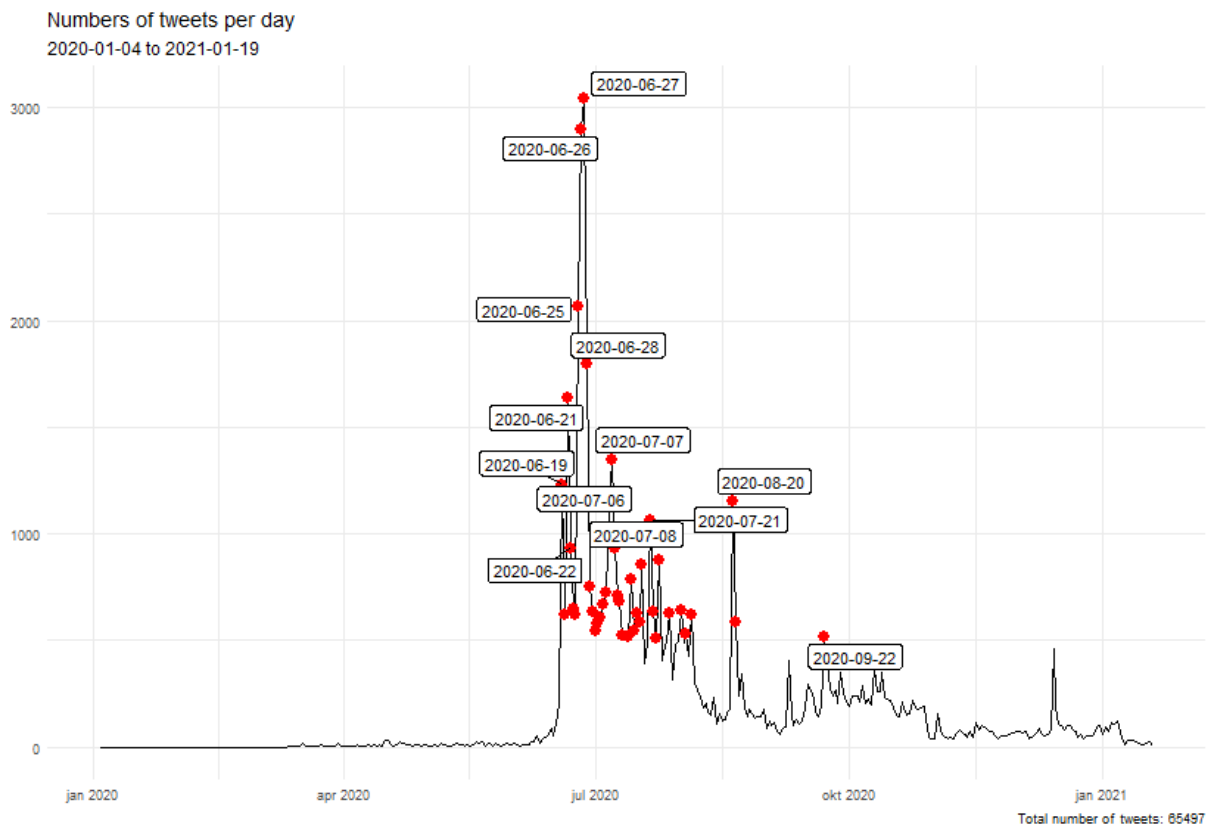
4.1.2   Type of tweets

To unravel the topics discussed among the conspiracy tweets, a hashtag analysis was executed over the complete set of conspiracy tweets. Some of the most used hashtags were clearly connected to conspiracy theories, yet not all of them were. The top 20 most used hashtags can be divided into seven categories. These categories are: *Viruswaarheid, General COVID, Political, Health, Pro COVID measures, Bill Gates,* and *Team Ali* (see Table 4). Below, an elaboration on these groups and their included hashtags will be given.

4.1.2.1 Viruswaarheid

The hashtags *viruswaanzin, viruswaarheid,* and *willemengel* make up the group of Viruswaarheid. Viruswaarheid is a Dutch action group who criticized the policies the Dutch government had in place regarding the COVID-19 virus. Viruswaarheid translates to "virus truth". The hashtags *viruswaanzin* and   *willemengel* also belong to this group, as Viruswaanzin is the previous name of the group

which they changed in August 2020 to Viruswaarheid (De Telegraaf, 2020). The hashtag *willemengel* refers to Willem Engel, the founder of the action group.

Viruswaarheid was involved in disputing general COVID-19 believes. For example, Viruswaarheid proclaimed that the COVID-19 measures taken by the government were ineffective, not necessary and out of proportion. Viruswaarheid then tried to gain insights into the documents regarding the COVID-19 measures from the National Institute for Public Health and the Environment via a lawsuit which rules against their request (NRC Handelsblad, 2020). On Twitter, the topic of Viruswaarheid being against the COVID-19 measures was recurring. Part of the people sympathized with Viruswaarheid on this, while others vastly disagreed with Viruswaarheid.

The large amount of hashtags relating to Viruswaarheid indicates that Viruswaarheid was a recurring topic in the conspiracy tweets. Their ideas of stopping the COVID-19 measures match the believes of many conspiracy believers that COVID-19 is a hoax. It is also in line with the tweets in which Viruswaarheid was mentioned in combination with COVID-19 being a hoax or the government having bad intentions. However, Viruswaarheid was also often mentioned by COVID-19 conspiracy opposers, who condemn the actions of the group and their leader Willem Engel. In these tweets, the opponents often made fun of or criticized the supporters and called them 'wappies' (wacky), a term used to describe COVID-19 conspiracy believers as well.

4.1.2.1 COVID-19

A number of hashtags could be related to COVID-19 in general, including c*oronamaatregelen, covid19, corona, coronavirus, covid19nl,* and *coronavaccin*. All those hashtags referred to COVID-19, the COVID-19 measurements or the COVID-19 vaccines in general, so without context they do not immediately seem related to COVID-19 conspiracy theories. The hashtags illustrated the topic in the tweets and were used when tweeting about new developments regarding COVID-19, such as updates on the COVID-19 vaccine or changing COVID-19 measures. The hashtags were also used in combination with combination with COVID-19 conspiracy theories, probably because COVID-19 is the topic of those theories. Because the general hashtags can be used by different groups in different context, they explain very little of the public debate.

4.1.2.3 Political

A few hashtags were related to politics: *rutte, denhaag* and *malieveld*. *Rutte* refers to Mark Rutte, prime minister of the Netherlands in 2020. Additionally, with the hashtag *denhaag* the users refer to The Hague, the city in which the national Dutch government is located. Lastly, *Malieveld* is the official place in The Hague were protests are held. Viruswaarheid has held protests on the Malieveld as well. These hashtags show that some of the discussions on Twitter were politically affiliated. This was mainly based on disagreement with the current politics and a discussion of political new events. In the tweets, COVID-19 conspiracy believers criticized government policies, mentioned demonstrations against such measures, voiced disagreement with the government, and mentioned

the "different" agenda from the government. Furthermore, the COVID-19 conspiracy opposers talked about the protests and other events the COVID-19 conspiracy believers were involved in.

4.1.2.4 Pro COVID-19 measures

Two hashtags among the most frequent hashtags can be seen as promoting the COVID-19 measures: *ikwildieprik* and *ikdoewelmee,* indicating that people in favour of the COVID-19 measures were included in the sample as well. The hashtag *ikdoewelmee* means "I am participating" and can be seen as a reaction on a social media action from different Dutch influencers in September 2020. The influencers proclaimed not wanting to partake in COVID-19 measures anymore by using the hashtag *ikdoenietmeermee*, which translates to "I am not participating anymore". This action was coordinated by the Viruswaarheid-founder Willem Engel (Nederlandse Omroep Stichting, 2020i). The other hashtag *ikwildieprik*, translates to I want that vaccine. About 20 different Twitter users included the hashtag in their screenname and in their tweets Viruswaarheid was mentioned often.

4.1.2.5 Health

Some hashtags were related to health organizations and the healthcare system, showing the engagement with the healthcare institutions. Those hashtags were *rivm, who,* and *codezwart*. The RIVM is the Dutch National Institute for Public Health and the Environment and the WHO is the World Health Organization. Both were engaged in monitoring the COVID-19 situation and giving advice on how to handle it. In the tweets, people questioned, discussed and criticized the advice these organisations gave. The WHO was also accused of working against society and having a double agenda regarding COVID-19, showing a link with the COVID-19 conspiracy theories. The hashtag *codeblack* refered to the possible code black: the moment in which hospitals cannot take in the amount of patients who need care anymore. The hashtag *codeblack* was also found in combination with topic Teamali, which is described below.

4.1.2.6 Bill Gates

The hashtag *billgates* was not directly relate to the other topics while it was specifically related to conspiracy theories, seeing as Bill Gates being a subcategory of COVID-19 being a way to control. The conspiracy topic of Bill Gates illustrated that specific COVID-19 conspiracy theories were mentioned in the conspiracy tweets. However, in the tweets Bill Gates was also mentioned sarcastically by people who did not believe in COVID-19 conspiracies.

4.1.2.7 Teamali

The last hashtag with its own category is *teamali*. When looking into the tweets, *teamali* appeared to be part of the hashtag *TeamAliëtte* and could be traced back to mostly one person using it in their screenname in combination with the hashtag "codeblack". Because the hashtag was placed in the screenname, it did not contribute to interpretation of the topics discussed in the COVID-19 conspiracy tweets. The tweets of this specific user made clear that they did not agree with Viruswaarheid.

Table 4

Overview of the 20 most used hashtags

Group	Hashtag	English translation	Number of times used
Viruswaarheid	Viruswaanzin	Virus madness	18146
	Viruswaarheid	Virus truth	1382
	Willemengel	Willem Engel (Founder of the Dutch action group "viruswaanzin")	773
COVID-19	Coronamaatregelen	Corona measures	3893
	Covid19	Covid19	2663
	Corona	Corona	2629
	Coronavirus	Coronavirus	2209
	Vaccin	Vaccine	2171
	Covid19NL	Covid19 NL	1071
	Coronavaccin	Corona vaccine	643
Political	Malieveld	Malieveld (formal place to protest in The Hague, the place where the Dutch government is situated)	1383
	Denhaag	The Hague	781
	Rutte	Rutte (as in Mark Rutte, the Dutch prime minister)	747
Pro COVID-19 measures	Ikwildieprik	I want that vaccine	1139
	Ikdoewelmee	I am participating	748
Health	Rivm	Abbreviation of National Institute for Public Health and the Environment	1053
	Who	WHO	1042
	Codezwart	Code black	991
Bill Gates	Billgates	Bill Gates	1383
Teamali	Teamali	Team Ali	834

4.2 NETWORK ANALYSIS

With the input of the 84,655 conspiracy tweets, a network was built based upon which people interacted with each other. This network was very large and failed to give a clear overview, therefore the network was split up in communities. These communities were also useful for detecting the information bias, homophily and social identification: the identity bubbles. The community detection resulted in 4252 groups being recognized and a modularity score of 0.63 was achieved. This is considered high modularity fitness (Himelboim et al., 2013). An overview of the 30 largest communities and a few general analyses of their main characteristics can be seen in Table 5.

For this research, only the 8 largest communities and community 12 were analysed into depth. Community 12 was chosen because it had no hashtags relating to specific COVID-19 conspiracy theories included among the top 20 most frequent hashtags. Furthermore, Community 1 has been excluded from the in-depth analysis as it included the whole generated network. For the in-depth analysis of the nine communities, various analysis were done for all communities. The following analysis were executed for these nine communities: tweets sent per day, hashtag analysis, most commonly used words, most common positive and negative words, and the five most important users. The results of these analysis for the nine communities and community 1 can be found in Appendix B. The notable results from the nine communities that were analyzed in-depth are discussed below. In these results, a distinction will be made between COVID-19 conspiracy believers and COVID-19 conspiracy opposers. COVID-19 conspiracy believers are the people who stated to believe in a COVID-19 conspiracy theory or show signs of believing in COVID-19 conspiracy theories such as being against COVID-19 measures. Supporters of Viruswaarheid were also deemed COVID-19 conspiracy believers. COVID-19 conspiracy opposers were people who disagreed with the COVID-19 conspiracy theories or who disagreed with Viruswaarheid.

Table 5

30 biggest communities and their main characteristics

Community number	Name if discussed	Size	Tweets included	Most tweets on	Amount of most tweets in one day	Distinct users
1*		6382	84655	27-6-2020	3044	13955
2		201	655	27-6-2020	26	130
3		3089	15456	26-6-2020	1042	3168
4		4187	35900	27-6-2020	1925	3542
5		2848	12416	10-10-2020	166	2059
6		227	887	26-8-2020	49	178
7		243	809	27-6-2020	52	166
8		187	812	26-6-2020	36	141
9		260	1254	27-6-2020	109	203
10		156	715	5-7-2020	33	113
11		151	455	19-6-2020	47	136
12		150	437	26-6-2020	20	110

13	132	426	6-7-2020	43	81
14	156	415	26-6-2020	19	90
15	222	826	26-6-2020	24	147
16	151	497	27-6-2020	137	132
17	215	648	5-8-2020	58	187
18	110	365	9-7-2020/9-8-2020	8	57
19	266	874	19-6-2020	105	244
20	94	254	27-6-2020	17	67
21	103	257	26-6-2020	45	97
22	81	295	25-6-2020	16	71
23	59	241	20-6-2020	25	45
24	67	136	7-10-2020	12	24
25	25	72	21-6-2020	8	19
26	28	62	22-7-2020	7	22
27	26	68	28-6-2020	8	26
28	23	75	20-8-2020	14	23
29	20	97	3-7-2020	17	15
30	20	51	8-7-2020	4	12

Note. Community 1 encompasses all conspiracy tweets, therefore this community is the same as the whole network of conspiracy tweets.

4.2.1   Community 4: Conspiracy opposers

Community 4 seemed to mostly exist out of COVID-19 conspiracy opposers. The content in the community was mainly about Viruswaarheid, COVID-19 in general, COVID-19 conspiracy theories and political topics. The most used hashtag referred to Viruswaarheid. The community members showed discontent regarding the actions from Viruswaarheid and the Viruswaarheid supporters, because they believed Viruswaarheid and the believers to contribute to the spread of COVID-19. In addition to this discontent, speculation regarding the next actions from Viruswaarheid or on how to handle Viruswaarheid supporters took place. Traces of the information bias can be detected surrounding the topic of Viruswaarheid. All five of the most important users in the community were against Viruswaarheid as well. The consensus of being opposed to COVID-19 conspiracy belief is a sign of homophily in this community: people are interacting with like-minded others who are also against the COVID-19 conspiracy theories and Viruswaarheid.

In line with the sentiment of opposing the COVID-19 conspiracy theories, two hashtags that appeared to be in favour of the COVID-19 measures and vaccine could be found in the top 20 most used hashtags of community 4 as well. Interestingly, these two hashtags were often placed in people's nicknames on Twitter. Thereby they showed explicit support for the measures and identified themselves as members of the group of supporters of COVID-19 measures.

4.2.2   Community 3: News community

Community 3 was defined as the news community, due to the strong focus on news and public debate in combination with three out of the five most important users being accounts from news sources. These news sources were mainly mentioned by other users, only one of the accounts

actually sent tweets itself, which were concerned with the news regarding production of the COVID-19 vaccine and how Donald Trump was handling vaccination in the United States of America. The link with politics was not only clear among these news sources, in the tweets political aspects were discussed in combination with specific COVID-19 conspiracy hashtags. Oftentimes, COVID-19 conspiracy believers criticized the government. This can be explained by the different view COVID-19 conspiracy believers have on COVID-19, sometimes even suggesting that the government is behind it. The association of COVID-19 conspiracy theories with politically engaged content and news sources demonstrated that COVID-19 conspiracy theories had become part of the public debate.

This connection to the public debate is also seen regarding the other two important users: Viruswaarheid and the Police unit from The Hague. The latter has only been mentioned and supported in tweets regarding breaking up demonstrations from Viruswaarheid. Viruswaarheid questioned the vaccine, governmental polities and obligated vaccinations. Others who mentioned Viruswaarheid voiced their discontent with them, questioning their actions and reprimanding Viruswaarheid. As seen, these topics all play into the then-current public debate. The information bias could even said to be present regarding the topics people talk about, as all users focus on the current public debate. Additionally, COVID-19 conspiracy theories are linked to political content again.

4.2.3   Community 5: Medicine

Community 5 is centred around medicine, which is seen in the dates on which many tweets were sent: the 16th of September and the 10th of October. On the 16th of September, Donald Trump announced that the COVID-19 vaccines would be ready in 3 to 4 weeks (Nederlandse Omroep Stichting, 2020h), which immediately was a popular topic on Twitter that day and the hashtag "trump" is used often in this community. In the tweets, people are happy with the news or do not believe it while others discuss Donald Trump using the vaccine to win his election. This topic again links COVID-19 conspiracy theories to politics. On the 10th of October, a news article appeared in which it stated that researchers discovered hydroxychloroquine might indeed help COVID-19 patients (van den Brink, 2020). Hydroxychloroquine also came forward in the hashtag analysis and is a known topic in COVID-19 conspiracy theories. In short, the community seems focussed on news regarding medicine and treatment for COVID-19 and linking politics effortlessly to COVID-19 conspiracy theories.

In addition to hydroxychloroquine and politics, Viruswaarheid was a common topic in community 5 as well. Two out of the three most important users of the community supported Viruswaarheid, one of them being sceptical regarding the government and politicians whereas the other believed the COVID-19 measures to be more harmful than COVID-19. The other crucial user was a virologist who sent a counter message, stating that not everyone considers the information from Viruswaarheid to be true. Due to their profession, the last user links back to medicine as well. Overall, COVID-19 conspiracy believers and COVID-19 conspiracy opposers are both present in this community.

4.2.4   Community 19: First banned protest

Community 19 defines itself by the focus on the banned protest from Viruswaarheid which was originally planned on the 21st of June at the Malieveld. Most tweets in the community were sent on the 19th of June, the day the protest on Sunday the 21st of June had been banned (Nederlandse Omroep Stichting, 2020b). Viruswaarheid still started summary proceedings against the ban, however to no avail (Nederlandse Omroep Stichting, 2020e). This protest at the Malieveld was a recurring topic in the community and was often discussed in combination with politics, resentment towards the government and mentioning the Malieveld.

In addition to this protest, COVID-19 conspiracy belief was a commonly discussed topic in the community as specific COVID-19 conspiracy theories were mentioned. Still, both COVID-19 conspiracy believers and opposers were present in the community. Among the five most important users, one actively debunked COVID-19 conspiracy theories while two others believed in them and the last two were neutral. However, the COVID-19 conspiracy opposers and COVID-19 conspiracy believers did not seem to get along, as the "us-vs-them" principle was displayed because both groups tried to disassociate from each other. The COVID-19 conspiracy opposers were called sheep and to be asleep, while the COVID-19 conspiracy believers were called wacky and crazy. A clear aspect of social identification is shown here. Additionally, due to the mix of these groups with the common topic of conspiracy theories, the humour effect is present. Meaning that the COVID-19 conspiracy opposers contributed to the spread of the COVID-19 conspiracy theories by talking about them.

4.2.5   Community 9, 7 and 15: Second banned protest

Community 9, 7, and 15 are combined into one topic as they were rather similar: all three consisted of a divided public, with both many COVID-19 conspiracy believers and many COVID-19 conspiracy opposers being present. Additionally, the second banned protest from Viruswaarheid planned for the 28th of June was a prominent topic in all three communities. The mix of COVID-19 conspiracy believers and COVID-19 conspiracy opposers exhibits that homophily is not present in the communities.

Although the three communities had many similarities, they also had their own distinct features. In community 9, the common topic of Viruswaarheid was often linked to the Malieveld and the protests. Two groups were present: the people who disassociated with the protesters and the people who considered protesting their right. Both used the other group as a scapegoat, employing the "us-versus-them" principle and displaying social identification. In community 7 public debate seemed to be a leading topic, illustrating how COVID-19 conspiracy belief can become part of the public debate. On the 20th of August, there was a lot of content regarding the police arresting protesters against the COVID-19 measures (Nederlandse Omroep Stichting, 2020a). Moreover, on the 22nd of September there was an Instagram action against the COVID-19 policies from the government led by Willem Engel in which multiple well-known Dutch celebrities and influences partook (Nederlandse Omroep Stichting, 2020i). Community 15 distinguished itself by the topic of COVID-19 conspiracy theories in combination with health organizations RIVM and WHO. Both were

criticized and accused of participating in COVID-19 conspiracies. Additionally, some users in this community spoke up against Viruswaarheid while still believing in the COVID-19 conspiracy theories, showing that not all COVID-19 conspiracy believers support Viruswaarheid.

4.2.6 Community 6: Conspiracy believers

Community 6 distinguishes itself by having a lot of content seemingly in favour of the COVID-19 conspiracy theories. A large group of COVID-19 conspiracy believers was present while there were also many sarcastic tweets about COVID-19 conspiracy theories. The sarcasm showed in a large group conversation, which also contributed to the day most tweets were sent. In this group conversation the Twitter users seemed to be sarcastic and about making fun of the COVID-19 conspiracy theories. Still, sarcasm can be hard to interpret online while the literal meaning usually is in favour of the COVID-19 conspiracy theories. Literally, this is an example of the humour effect.

The group of COVID-19 conspiracy believers mostly discussed specific COVID-19 conspiracy theories, discussed about and agreed with Viruswaarheid. Furthermore, they mentioned elites, the government and politicians which indicates the link between COVID-19 conspiracy theories and political aspects again. The use of the word "elites" on the other hand indicates a disassociation of the COVID-19 conspiracy believers with this group, a negative form of social identification.

4.2.7 Community 12: Viruswaarheid & Politics without conspiracy belief

The last community, community 12 shows a focus on politics and Viruswaarheid. Regarding Viruswaarheid, many tweets were sent in relation to the protest planned for the 28th of June. Three out of the five most important users spoke up against Viruswaarheid. In this community, dangers Viruswaarheid poses for society were discussed, aversion for Viruswaarheid was shown and it was even mention that Willem Engel had to be stopped. The writers of these tweets clearly distanced themselves from Viruswaarheid, viewing them as a different group or movement in society: an outgroup.

In addition, the topic of politics was a recurring theme. The parties Forum voor Democratie (FVD) and Partij Voor de Vrijheid (PVV) were mentioned multiple times. FVD and party leader Thierry Baudet had a right-wing conservative points of view (Ornstein, n.d.) and Thierry Baudet and other party members have been linked to COVID-19 conspiracy theories as well (Bouma & de Kruif, 2021; Nederlandse Omroep Stichting, 2020j). This fits the view that people on the right-wing of the political spectrum are more prone to support conspiracy theories (Furnham, 2021). Furthermore, one of the crucial users of the community has been a party member of the PVV. This user was mentioned very often by the other users. As it shows, most of the Twitter users included in this community do not associate with these political parties. This displays both the "us-versus them" principle and the link between politics and COVID-19 conspiracy theories.

4.3 OVERVIEW OF THE RESULTS

Overall, this research produced several interesting results based on the analysis of the COVID-19 conspiracy tweets and the communities reviewed into depth. The common topics were

Viruswaarheid, politics and non-conspiracy belief which came back in most communities. While Viruswaarheid was a prominent topic in all communities, the communities did differ from each other based on other topics discussed. Only a few communities differed from other communities because of their composition. These two communities were more homogenous, meaning that the homophily was more present in these communities. Homophily was not present much in most communities due to both COVID-19 conspiracy believers and COVID-19 conspiracy opposers contributing to the community. This did demonstrate the humour effect in most communities, which also implies that COVID-19 conspiracy theories have become part of the public debate. In most communities a form of social identification was seen as the COVID-19 conspiracy believers and COVID-19 conspiracy opposers were disassociating from each other. Disassociation from the government and politics also happened, mostly by the COVID-19 conspiracy believers, although both groups discussed political developments in relation to COVID-19. Linking the COVID-19 conspiracy theories to politics again also embeds these theories in the public debate.

5. DISCUSSION

This chapter reviews the most important results of this research in terms of what they mean for this study and the related field of research. In this research, a few prominent results came forward, namely the humour effect, the lack of the original information bias and homophily, disassociation of COVID-19 conspiracy believers with COVID-19 conspiracy opposers and the other way around, and politics as a theme among the COVID-19 conspiracy theories. Moreover, the limitations and future implications of this study are reviewed.

5.1   MAIN FINDINGS

Communities regarding COVID-19 conspiracy theories evolve around specific COVID-19 conspiracy theories and beliefs that ended up in the mainstream public debate. Both the COVID-19 conspiracy believers and COVID-19 conspiracy opposers tweeted about these COVID-19 conspiracy theories, indicating the humour effect being present. Political topics linked to COVID-19 conspiracy theories are often discussed, because politics are connected to the public debate and are also often included in the topic of the COVID-19 conspiracy theories. For example, the government can be held accountable for the COVID-19 pandemic by the COVID-19 conspiracy believers. By means of social identification, the COVID-19 conspiracy believers disassociate from the government, eventually using the government as scapegoat. The COVID-19 conspiracy believers and COVID-19 conspiracy opposers both identified with their own ingroup and disassociated with the other group, which leads to polarization. Because the COVID-19 conspiracy believers and COVID-19 conspiracy opposers were both present in the communities, homophily has been detected very little. The information bias has not been detected either, as different types of information and different points of view regarding the topic of the community were included in said community. With both the information bias and homophily not being present, it could be said that the view regarding forming communities based on like-minded others is inaccurate. COVID-19 conspiracy communities form around specific topics regarding COVID-19 conspiracy theories which discussed in the mainstream public debate. The characteristics of these communities are then partly determined by these topics and COVID-19 conspiracy theories, although they do not predict if the community members believe in COVID-19 conspiracy theories.

The most popular topic in the communities regarding COVID-19 conspiracy theories was Viruswaarheid, with other popular topics being specific COVID-19 conspiracy theories and politics. The latter is discussed below, as it connects to the political perceptions. The other topics, Viruswaarheid and the specific COVID-19 conspiracy theories, were supported by COVID-19 conspiracy believers and talked about by COVID-19 conspiracy opposers in all communities. This means the humour effect (Ahmed et al., 2020) was very much present, the COVID-19 conspiracy opposers contributed to the spread of COVID-19 conspiracy theories by mocking and tweeting about them. With both groups talking about Viruswaarheid and COVID-19 conspiracy theories, the COVID-19 conspiracy theories became part of the public debate. Viruswaarheid has enabled this, with their protests and public actions which even made the news. News media and social media are

entangled, as both report on the content of the other platform (Shahsavari et al., 2020). Talking and tweeting about Viruswaarheid and COVID-19 conspiracy theories can affect conspiracy belief as being exposed to lots of fake news about COVID-19 vaccination can result in trusting the COVID-19 conspiracy theories more (Buturoiu et al., 2021). Overall, the specific COVID-19 conspiracy content is related to the public debate, it even became part of the public debate due to Viruswaarheid being reported on in the news media.

Politics were often discussed in combination with COVID-19 conspiracy theories. This is in line with social media being a place on which social and political topics are discussed (Mameli et al., 2022), such as the COVID-19 conspiracy theories which turned into topics in the public debate. Another example were authorities, such as the government and politicians often being mentioned in the corpus and communities in combination with politics. Two types of political perception can be seen, the first being politics as a topic due to political involvement in the COVID-19 pandemic by COVID-19 measures, lockdowns and regulated protests. Furthermore, direct political involvement with COVID-19 conspiracy theories is also likely, because right wing politicians and political parties played a role in the dissemination of COVID-19 conspiracy content, which is in line with findings Gruzd and Mai (2020) that conservative politicians and right-wing activists contribute. This explains the political content to be part of the public debate. The other political perception has a more direct link to COVID-19 conspiracy belief, because some of the COVID-19 conspiracy theories hold the government accountable for the COVID-19 pandemic. Basically, this is the inclusion of politics in the COVID-19 conspiracy theories.

When politics are involved in or the topic of the COVID-19 conspiracy theories in some manner, the concept of social identification can explain the positive or negative communication regarding the government and politics. Social identification was not seen regarding the community as a whole, rather as a group in the community. The social identification concerning politics showed through putting down outgroups and acting superior about one's ingroup or defending it. The COVID-19 conspiracy believers often scapegoated the government, while defending their own beliefs. Being defensive about one's ingroup can be explained by collective narcissism, as believing in conspiracy theories could explain why the ingroup is not getting the recognition it should get, which can lead to blaming outgroups for their setbacks (Biddlestone et al., 2021). According to Biddlestone et al. (2021), the collective narcissism and feeling that the ingroup is a victim can especially lead to belief in conspiracy theories that scapegoat an enemy, in this case, the government. Social identification in the communities regarding COVID-19 conspiracy theories resulted in collective narcissism from the COVID-19 conspiracy believers who scapegoated the government.

As mentioned, social identification has played a role in accusing other parties to be responsible for or contributing to the pandemic due to scapegoating. This is seen in the COVID-19 conspiracy theories about COVID-19 being manmade, COVID-19 being a way to control and Bill Gates being related to COVID-19. The consequences of social identification and its related scapegoating can be extended. Seeing the government as an enemy through social identification can also explain the violent protests and riots in the Netherlands regarding COVID-19 measures

(Nederlandse Omroep Stichting, 2021). In Slovakia, the government was also seen as a malevolent outgroup in COVID-19 conspiracy belief. The anger associated with it could have caused the anti-government protests to become violent (Šrol et al., 2022). As such, social identification can explain COVID-19 conspiracy belief regarding COVID-19 conspiracies in which an actor takes the blame for the COVID-19 pandemic, which might lead to (violent) actions against said actor.

The social identification apart from politics mostly took place on the level of COVID-19 conspiracy believers identifying with other COVID-19 conspiracy believers and COVID-19 conspiracy opposers identifying with other COVID-19 conspiracy opposers. Furthermore, the COVID-19 conspiracy believers and COVID-19 conspiracy opposers actively disassociated from each other. The COVID-19 conspiracy believers did not want to be associated with people who believed in the scientific consensus, whereas the COVID-19 conspiracy opposers considered the COVID-19 conspiracy believers to contribute to the spread of COVID-19 because they would not follow the COVID-19 measures. Both groups would insult the other group. These actions are in line with conspiracy content contributing to polarization due to the hateful content (Monaci, 2021), meaning that COVID-19 conspiracy believers and COVID-19 conspiracy opposers disassociating from each other contributes to polarization.

Considering that social identification did not occur over communities in full, only over a group in the community, it is logical that homophily has not been detected in most communities either. The COVID-19 conspiracy believers and COVID-19 conspiracy opposers interacted in the same network, contradicting the homophily. Homophily is usually demonstrated by echo chambers which were not found in this research. The communities showed a mix of COVID-19 conspiracy believers and COVID-19 conspiracy opposers while echo chambers consists of only opinions confirming the users beliefs (Risius et al., 2019). That no echo chambers were found is in line with the lack of scientific consensus on the emergence and manifestation of them (Risius et al., 2019).

The information bias has also not been detected in the communities concerning COVID-19 conspiracy theories because different types of information have been introduced in the communities with different point of views. The COVID-19 conspiracy believers brought information in favour of the COVID-19 conspiracy theories, whereas COVID-19 conspiracy opposers brought information against the COVID-19 conspiracy theories. However, both the COVID-19 conspiracy believers and the COVID-19 conspiracy opposers spoke about the same topics and COVID-19 conspiracy theories, such as Viruswaarheid and hydroxychloroquine. This again demonstrates the COVID-19 conspiracy theories becoming a part of the mainstream public debate, although it could also mean something different: the information bias is present based on topic, not on opinion or type of information. Networks based on the same topics while including people with different points of view does seem possible, considering that cross-ideological tweeting, engaging with people with different believes, happens regarding political topics already (Gruzd & Roy, 2014). In short, while the original information bias was not present, a type of information bias regarding topics was detected, meaning that COVID-19 conspiracy communities form around specific topics and COVID-19 conspiracy theories.

5.2   FUTURE RESEARCH & LIMITATIONS

This research has a few implications for future research, as well as some limitations. These limitations should be taken into account when interpreting the results from this study. The future research implications will be discussed first after which the limitations will be disclosed.

5.2.1   Future research implications

The main result of this research is the finding that COVID-19 conspiracy communities on Twitter form around specific COVID-19 conspiracy topics instead of being based on like-mindedness with others. As mentioned, interaction on Twitter between people with different believes on the same topic, cross-ideological tweeting, is already happening among tweets concerning politics (Gruzd & Roy, 2014) and mostly among liberals (Barberá et al., 2015). However, conspiracy tweets are related more often to conservative political believers. More research into cross-ideological tweeting between COVID-19 conspiracy believers and COVID-19 conspiracy opposers which looks into political orientation as well might shine a light on these discrepancies.

Furthermore, research into improving trust into the government or creation of a shared social identity by the COVID-19 conspiracy believers and the government is recommended. In this study, the government is as an outgroup by the COVID-19 conspiracy believers, which affects trust in the government because outgroup members are perceived to be less trustworthy (Kaakinen et al., 2020). Overall, COVID-19 conspiracy believers have lower trust in the government (Šrol et al., 2022) or even distrust the government (Buturoiu et al., 2021). Trust is a necessary factor on getting people to follow the COVID-19 measures (Falcone et al., 2020), meaning it can affect the spread of COVID-19. Further research on improving trust in the government and creating shared social identities could help to understand and prevent violent protest as well as people not following the set measures.

5.2.2   Limitations

The limitations of this study have to do with a possible bias, missing data, and missed nuances, which can all be traced back to the methods employed in this research. The first, a possible bias, can be traced back to the corpus. People on twitter tend to have a higher education and income and are on average younger than the general population (Wojcik & Hughes, 2019). Therefore, it does not represent the general population. However, this research specifically searched for COVID-19 conspiracy tweets, although the demographics between Twitter users and COVID-19 conspiracy believers still do not align. When filtering out the COVID-19 conspiracy tweets, this might have been solved, although it cannot be checked. Moreover, in the case of social media data, only data is included from the Twitter users. In the United Kingdom, around 24% of the population uses Twitter, while not even all users create content (Esfahani et al., 2019). Therefore, the data might not be generalizable to offline situations.

In addition to the bias in the data, it is probable that not all Twitter data was gathered. It is impossible to know if all tweets sent on Twitter in the time period have been gathered. Plus, it is

likely to get measurement errors, outliers and missing values among the dataset when using large amounts of data (Fan et al., 2014). This is also seen in the analysis of tweets per day over the whole sample, as not all tweets were to be included.

Another limitation are the nuances, which can be seen on two levels. The first is the community level, as only 9 communities have been analysed into depth. Those communities have been sorted on features of the community that made it stand out from the other communities. Still, this does not mean that such a community only discussed the topic which made it stand out. The second level of nuances is seen in opinions of the Twitter users. While they have been divided in COVID-19 conspiracy believers and COVID-19 conspiracy opposers for this study, there is a nuance to this. For example people questioning the government albeit still disagreeing with the COVID-19 conspiracy theories. Others would agree with many of the actions and beliefs of Viruswaarheid, while not believing in the COVID-19 conspiracy theories. These nuances could be found among the COVID-19 conspiracy believers as well as the COVID-19 conspiracy opposers, as such there is no definition of *the COVID-19 conspiracy believer* or *the COVID-19 conspiracy opposer*.

5.3 CONCLUSION

In conclusion, this research has taken notice of COVID-19 conspiracy communities on Twitter forming around a topic instead of like-minded people. These topics are specific COVID-19 conspiracy theories or topics linked to COVID-19 conspiracy theories that became part of the mainstream public discussion. The communities consist of both COVID-19 conspiracy believers and COVID-19 conspiracy opposers. As COVID-19 conspiracy believers also talk about the COVID-19 conspiracy theories demonstrates that they contribute to the spread of these COVID-19 conspiracy theories, which is called the humour effect. The COVID-19 conspiracy believers on the other hand participated in collective narcissism, leading to them scapegoating the government, which is one example of politics being involved in the COVID-19 conspiracy communities. More research is necessary regarding people with different COVID-19 conspiracy beliefs interacting with each other and their political orientation and communication. Trust in the government and creating a shared social identity between the government and COVID-19 conspiracy believers are also topics of further research, to prevent (violent) protests and ensure people follow the COVID-19 measures.

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7. APPENDICES

7.1   APPENDIX A

Table A1

Overview of the conspiracy searchwords

Number	Word	English translation
1	Hoax	Hoax
2	Nep	Fake
3	Gevaarlijk	Dangerous
4	Dodelijk	Deadly
5	Biowapen	Bioweapon
6	Bill Gates	Bill Gates
7	5G	5G
8	Straling	Radiation
9	Lab	Lab
10	Laboratorium	Laboratory
11	Donald Trump	Donald Trump
12	Trump	Trump
13	Nanochip	Nanochip
14	Nano	Nano
15	Chip	Chip
16	Chippen	Chipping, to chip
17	Microbots	Microbots
18	Ingespoten	Injected
19	Vaccinatieplicht	Vaccination obligation
20	Verplicht	Obligated
21	Inspuiten	Inject
22	Fase	Phase
23	Horror	Horror
24	Spuiten	Inject
25	Complot	Conspiracy
26	Schuld	Blame
27	DNA	DNA
28	Gif	Poison
29	Moord	Murder
30	Uitroeien	Exterminate
31	Kill Bill	Kill Bill
32	Kill Billy	Kill Billy
33	Willem Engel	Willem Engel (Founder of the Dutch action group "viruswaanzin")
34	Macht	Power
35	Angst	Fear
36	Bang	Afraid
37	Dictatuur	Dictatorship
38	Agenda	Agenda

39	Genetica	Genetics
40	WHO	WHO
41	Wakker	Waking
42	Wakker worden	Waking up
43	Lammetjes	Lambs
44	Lammetje	Lamb
45	Ontwaken	Awaken
46	Globalistisch	Globalistic
47	Globalistische regering	Globalistic government
48	Schaapjes	Sheep
49	Schapen	Sheep
50	Schaap	Sheep
51	Farmacie	Pharmacy
52	Big Pharma	Big Pharma
53	Fraude	Fraud
54	Farmaceutisch verdienmodel	Pharmaceutical revenue model
55	Farmaceutisch	Pharmaceutical
56	Verdienmodel	Revenue model
57	Geneesmiddelenindustrie	Pharmaceutical industry
58	Farma	Pharma
59	HCQ	HCQ (abbreviation hydroxychloroquine)
60	Hydrochloroquine	Hydroxychloroquine (but spelled wrong)
61	Hydrochloriquine	Hydroxychloroquine (but spelled wrong)
62	Hydroxychloroquine	Hydroxychloroquine
63	Zink	Zinc
64	HCQ-AZ	HCQ-AZ (abbreviation hydroxychloroquine with azitromycin)
65	Profylaxe	Prophylaxis
66	Plandemic	Plandemic
67	Gates	Gates
68	Bill	Bill
69	Viruswaanzin	Virus madness (Dutch action group)
70	Covidhoax	Covidhoax
71	Coronahoax	Coronahoax
72	Great reset	Great reset
73	Greatreset	Greatreset
74	WEF	WEF
75	World Economic Forum	World Economic Forum
76	Klaus Schwab	Klaus Schwab
77	Schwab	Schwab
78	Rockefeller	Rockefeller
79	Elite	Elite

7.2 APPENDIX B

D.1 Community 1
Figure D1

Top 20 most frequently used hashtags in community 1
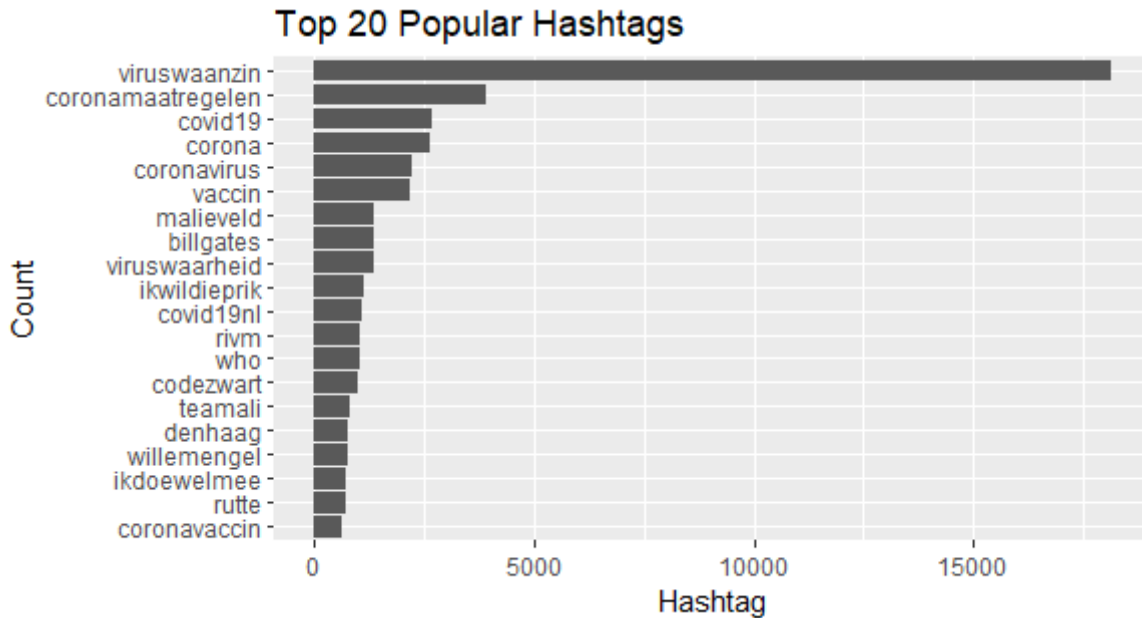
Figure D2

Top 20 most frequently used words in community 1
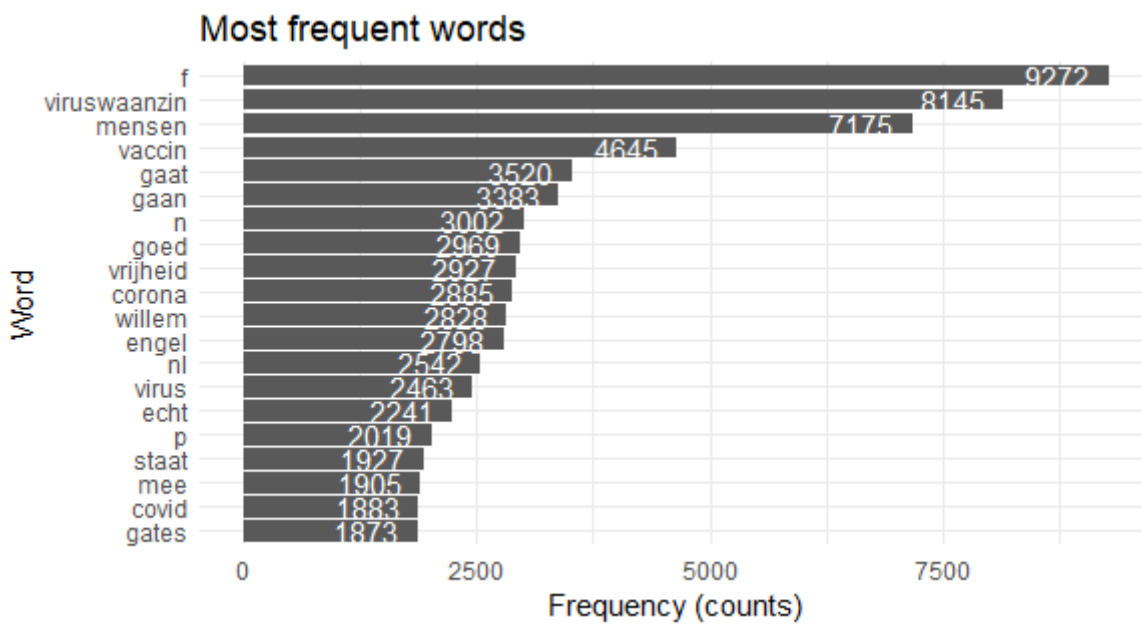
D.2 Community 4

Figure D3

Number of tweets sent per day in community 4
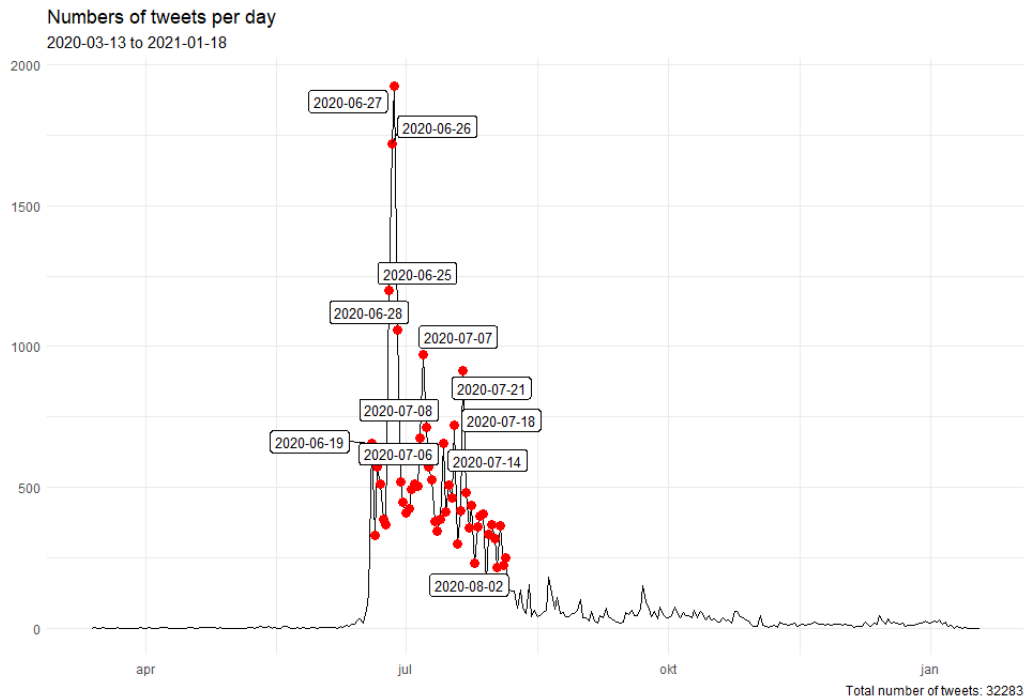
Note. The days on which more than 200 tweets were sent are marked with a red dot.

Figure D4

Top 20 most frequently used hashtags in community 4
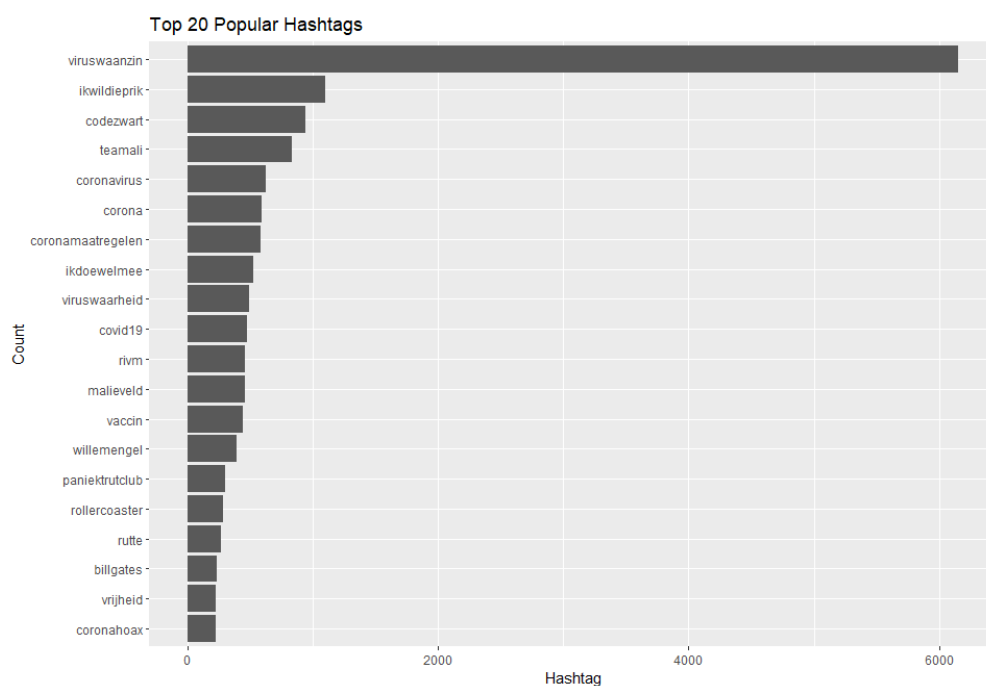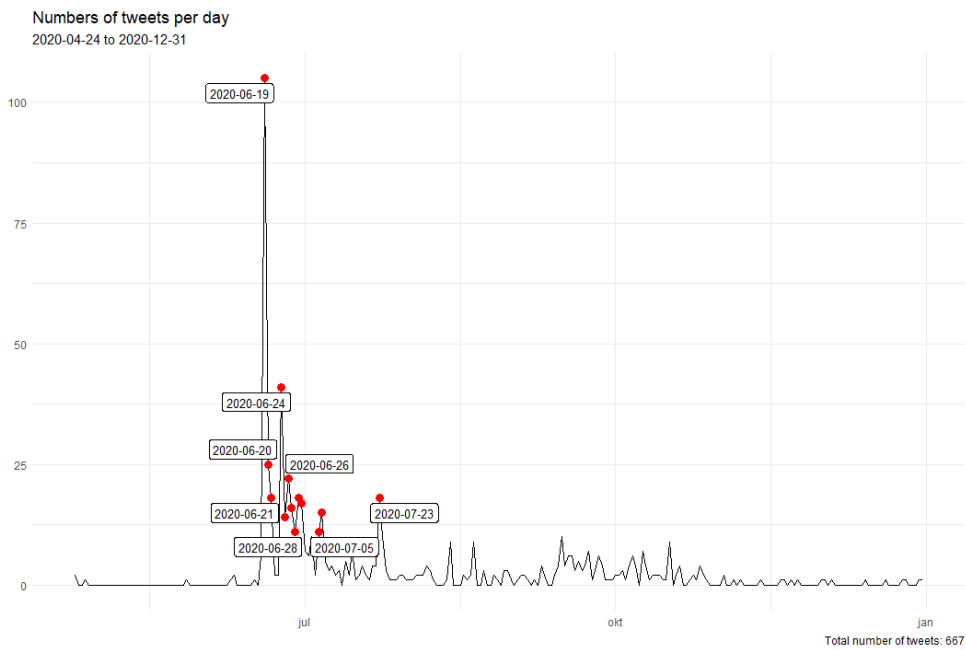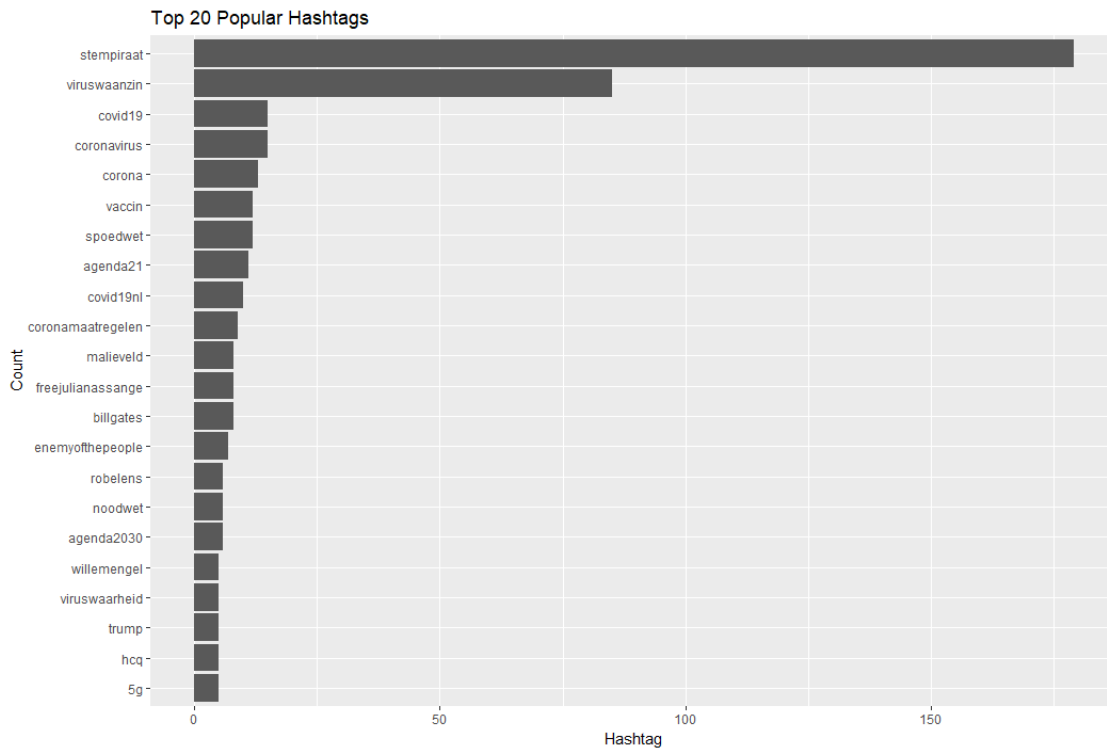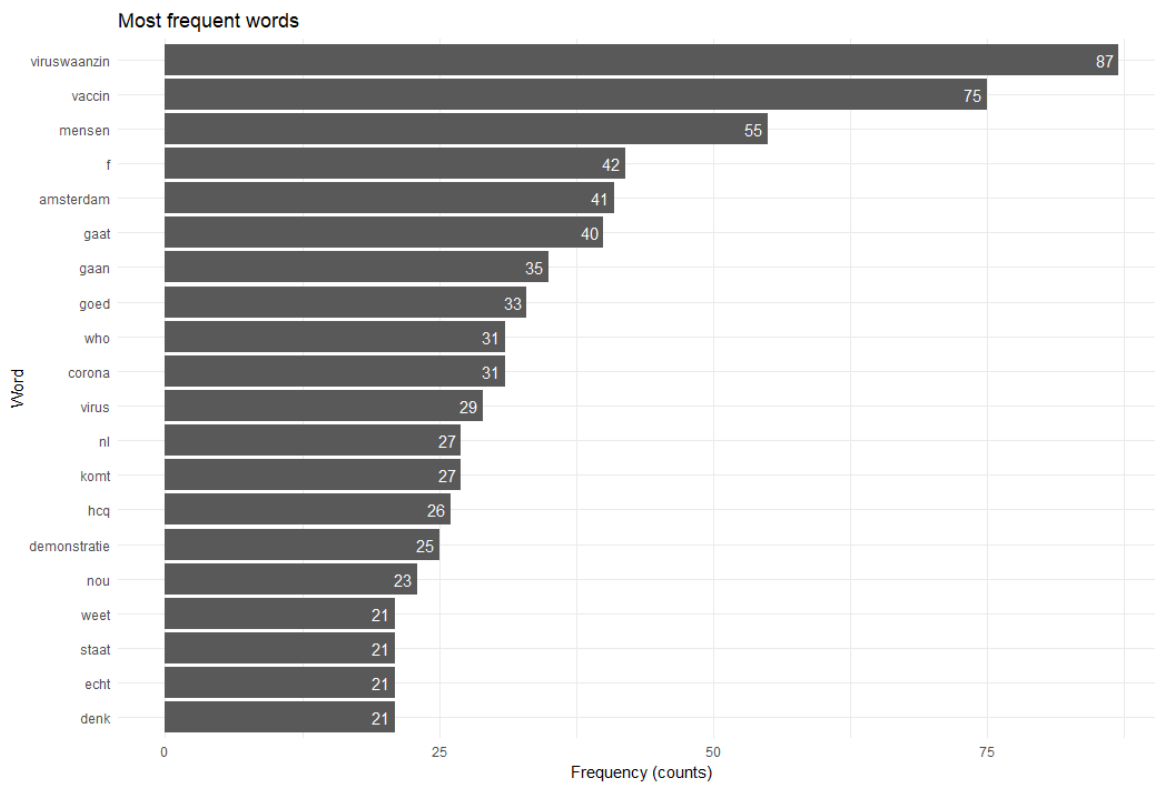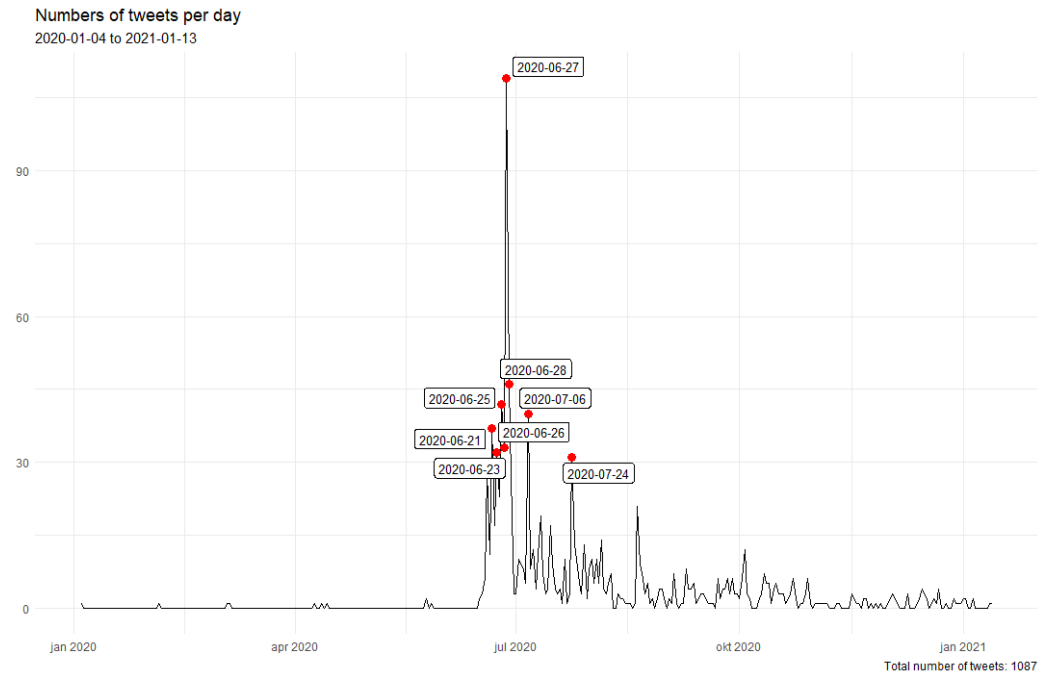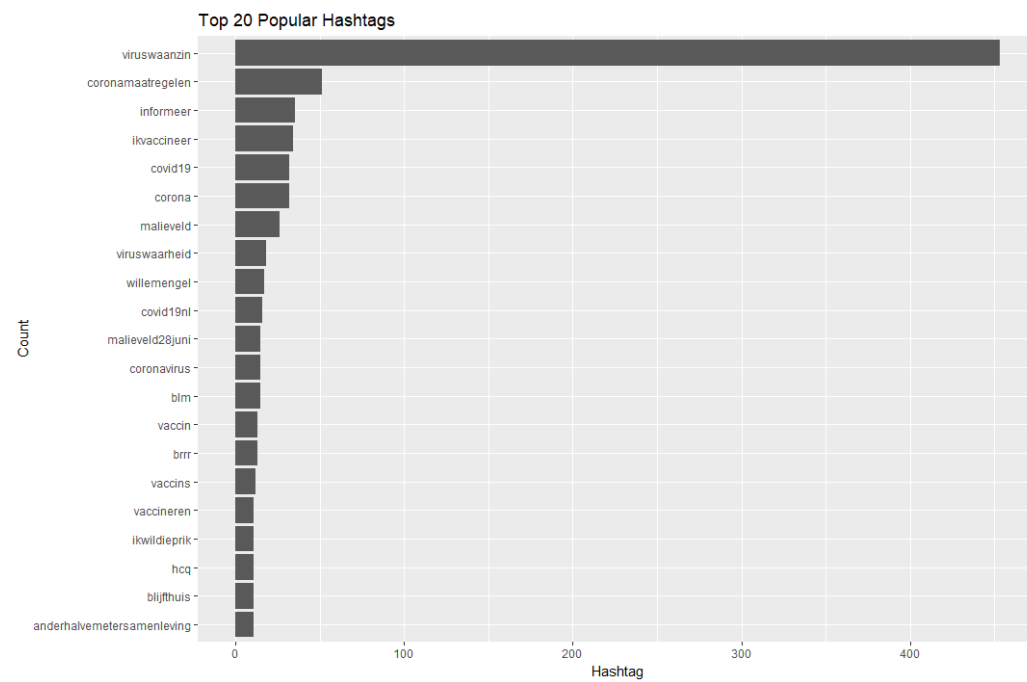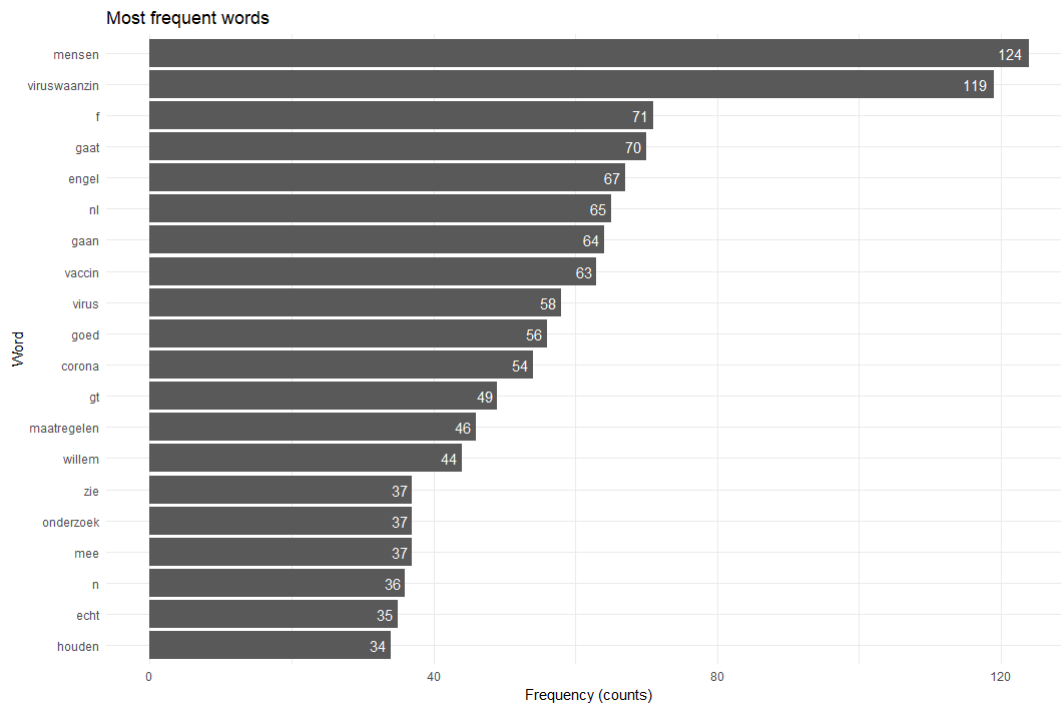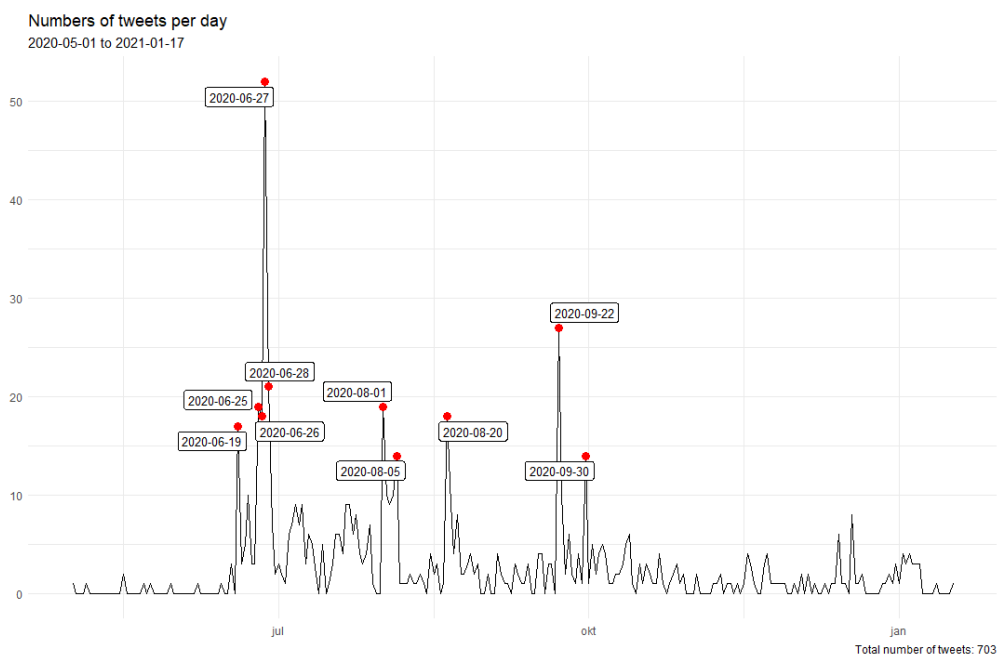
Figure D5

Top 20 most frequently used words in community 4
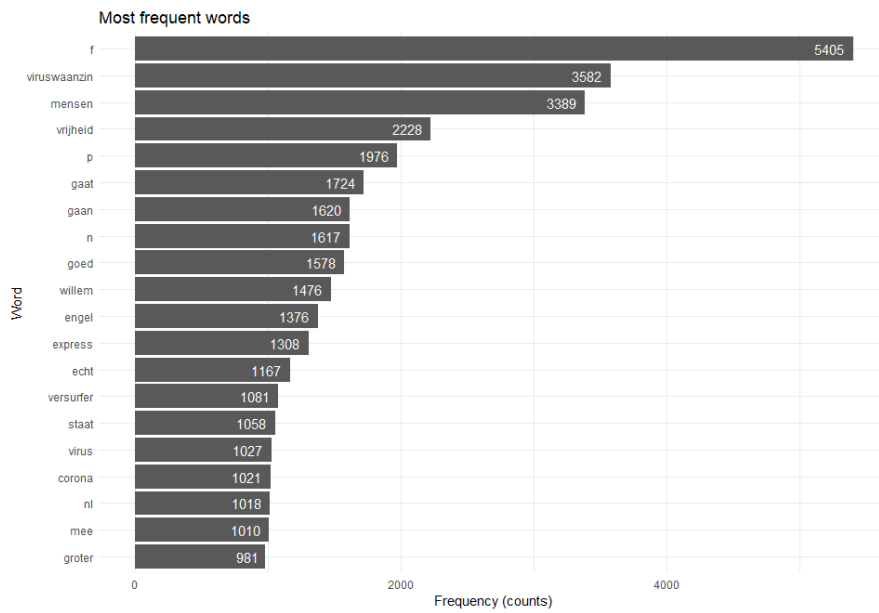
D.3 Community 3

Figure D6

Number of tweets sent per day in community 3
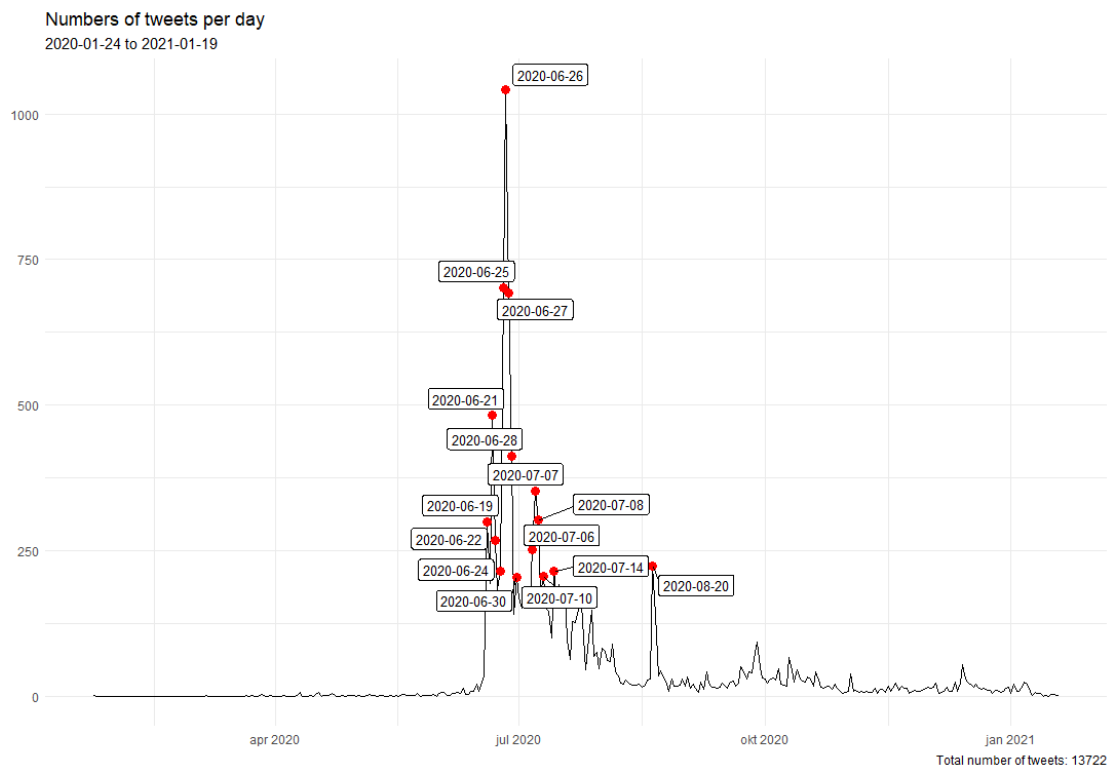
Note. The days on which more than 150 tweets were sent are marked with a red dot.

Figure D7

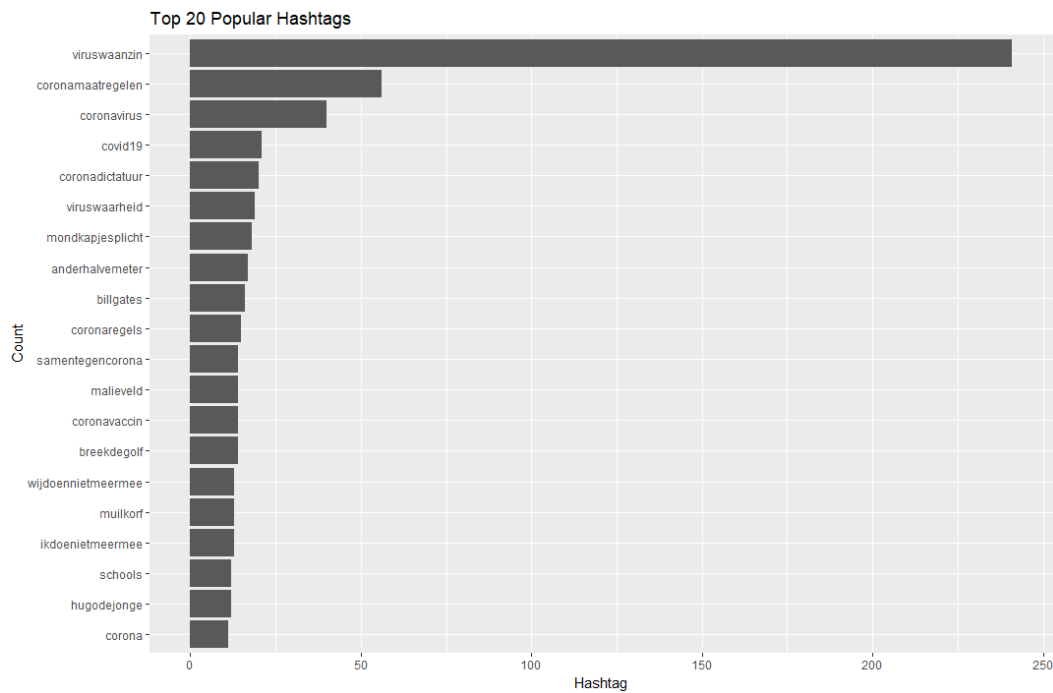*Top 20 most frequently used hashtags in community 3*
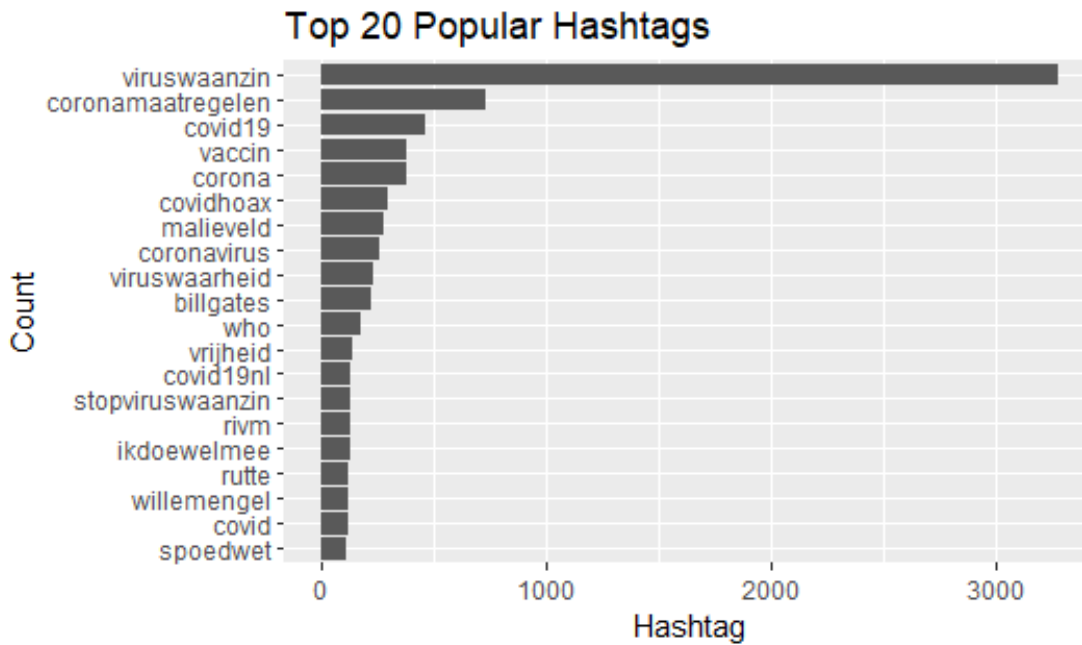
Figure D8

Top 20 most frequently used words in community 3
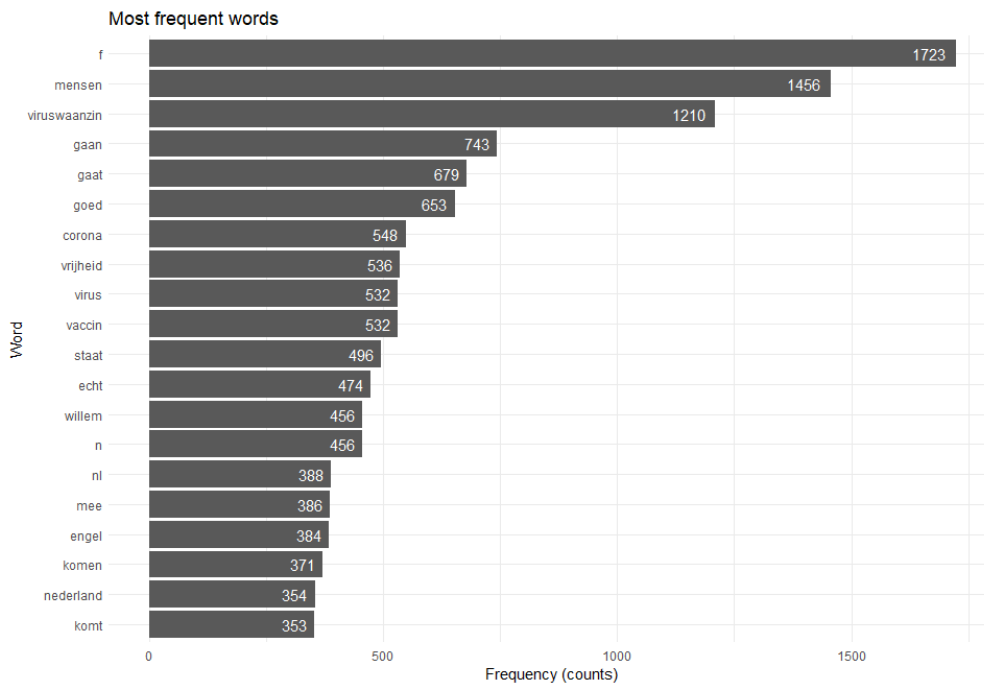
D.4 Community 5

Figure D9

Number of tweets sent per day in community 5
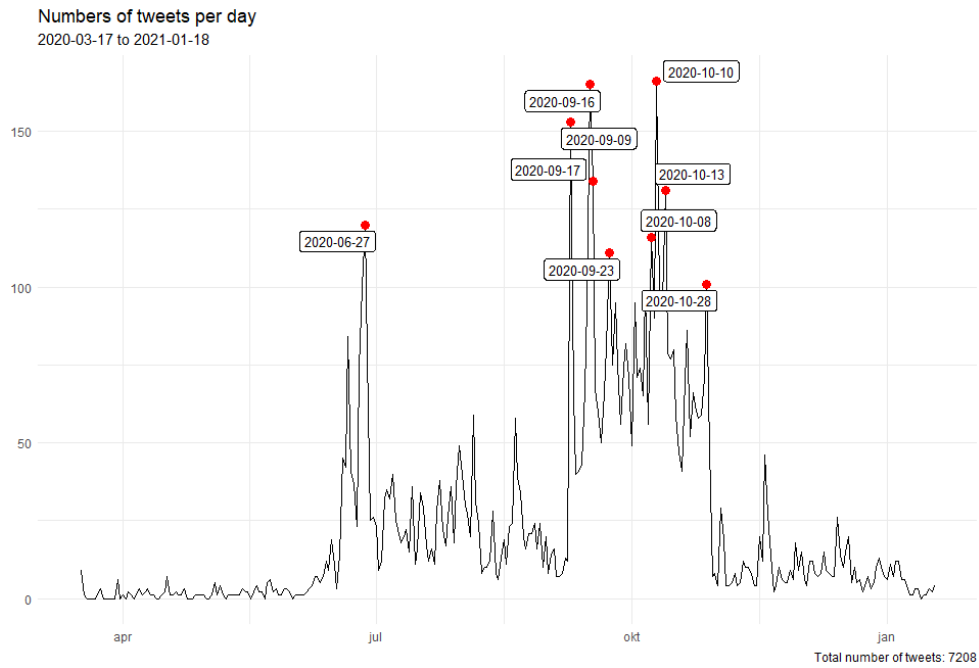
Note. The days on which more than 100 tweets were sent are marked with a red dot.

Figure D10
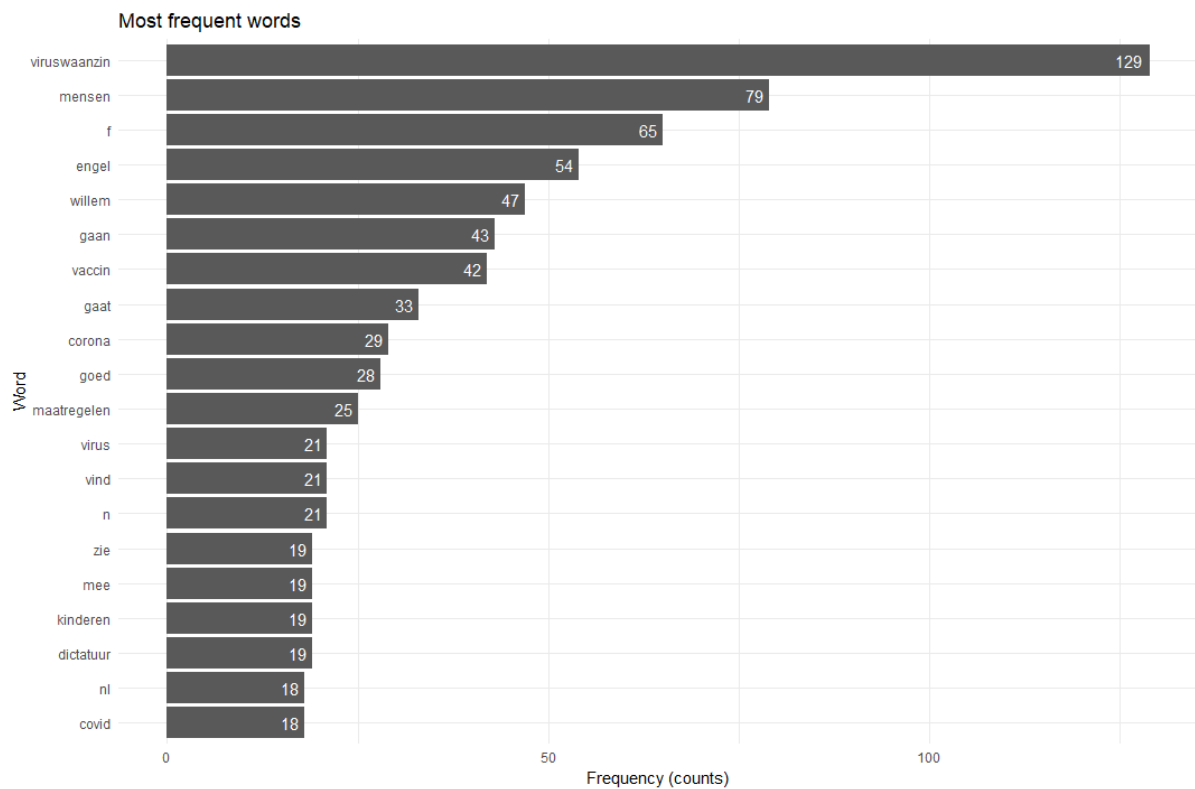
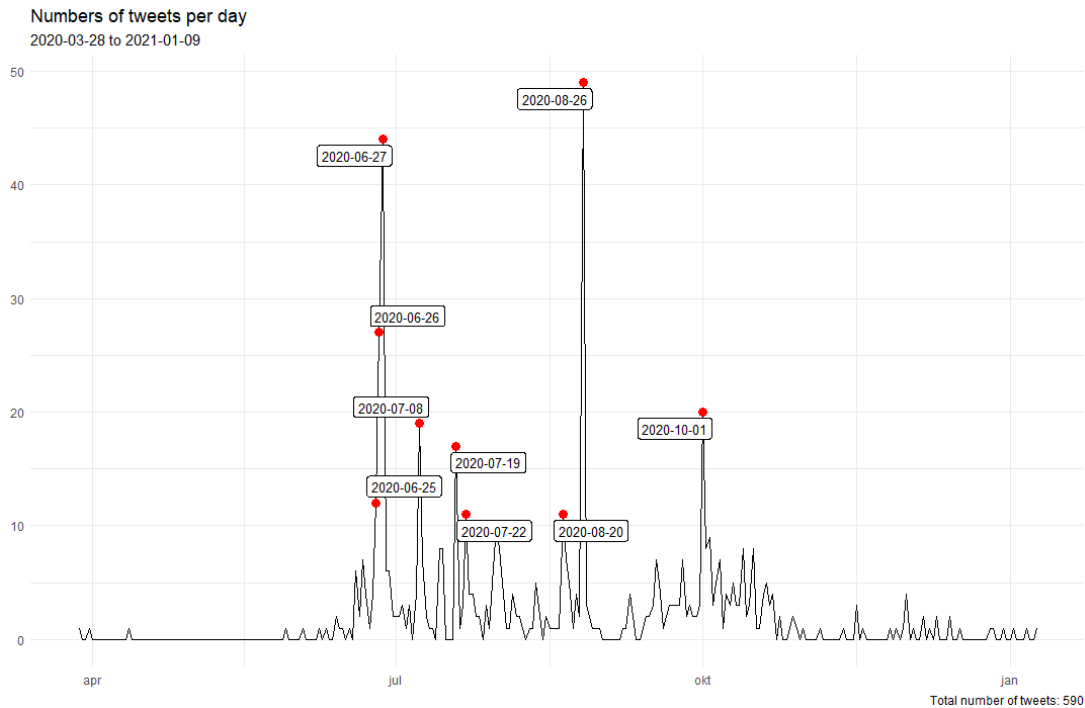*Top 20 most frequently used hashtags in community 5*
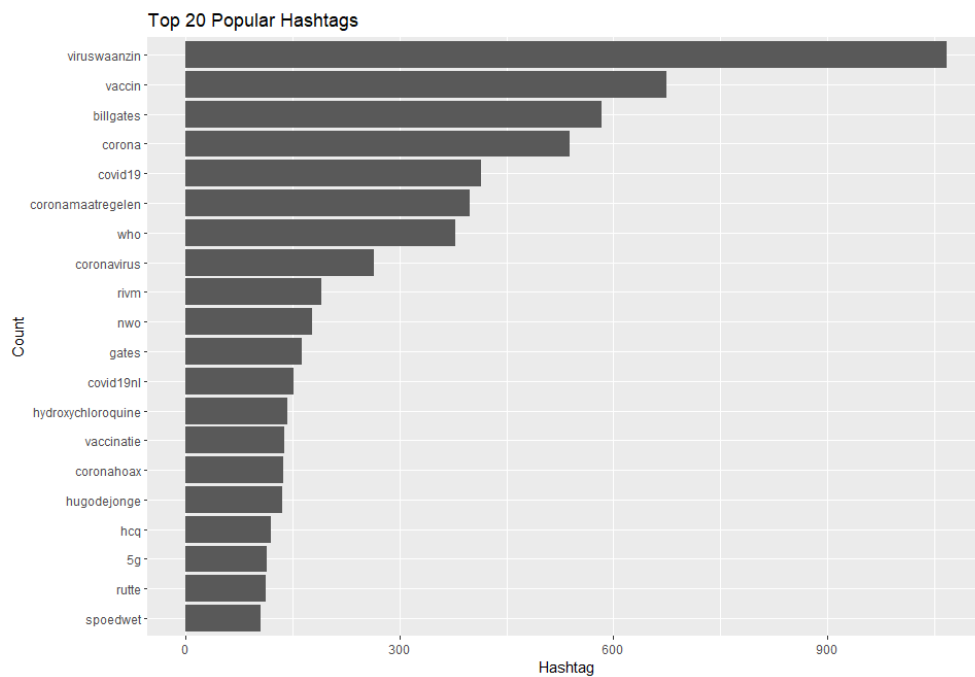
Figure D11

Top 20 most frequently used words in community 5
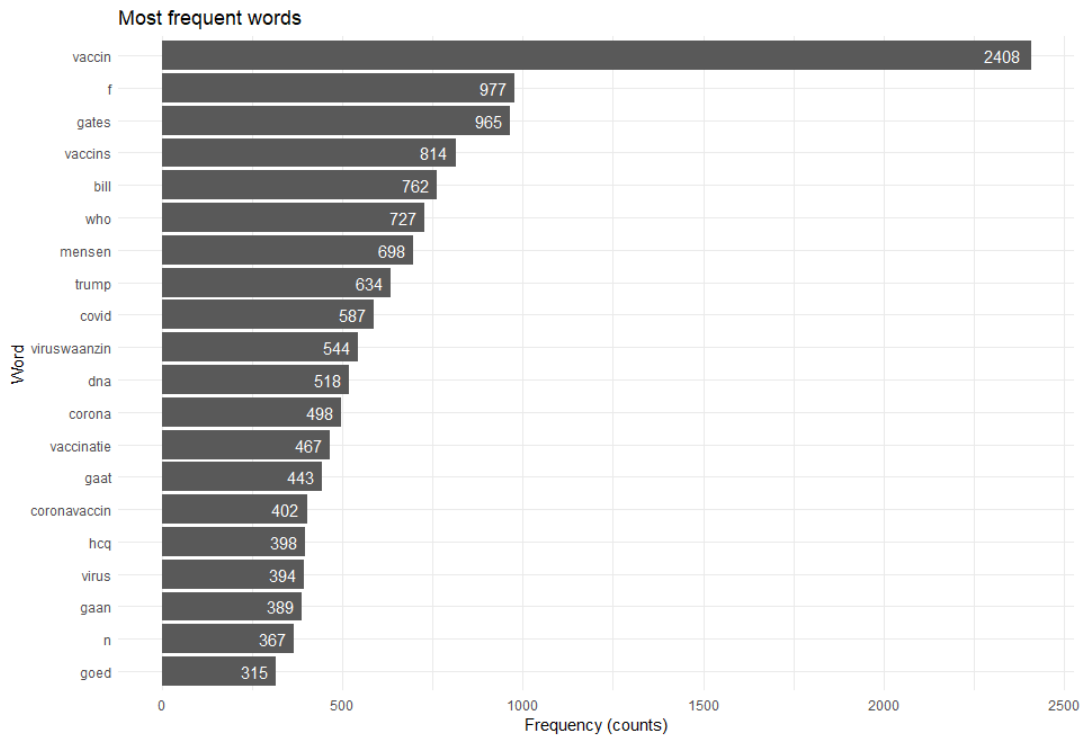
D.5 Community 19

Figure D12

Number of tweets sent per day in community 19

Note. The days on which more than 10 tweets were sent are marked with a red dot.

Figure D13

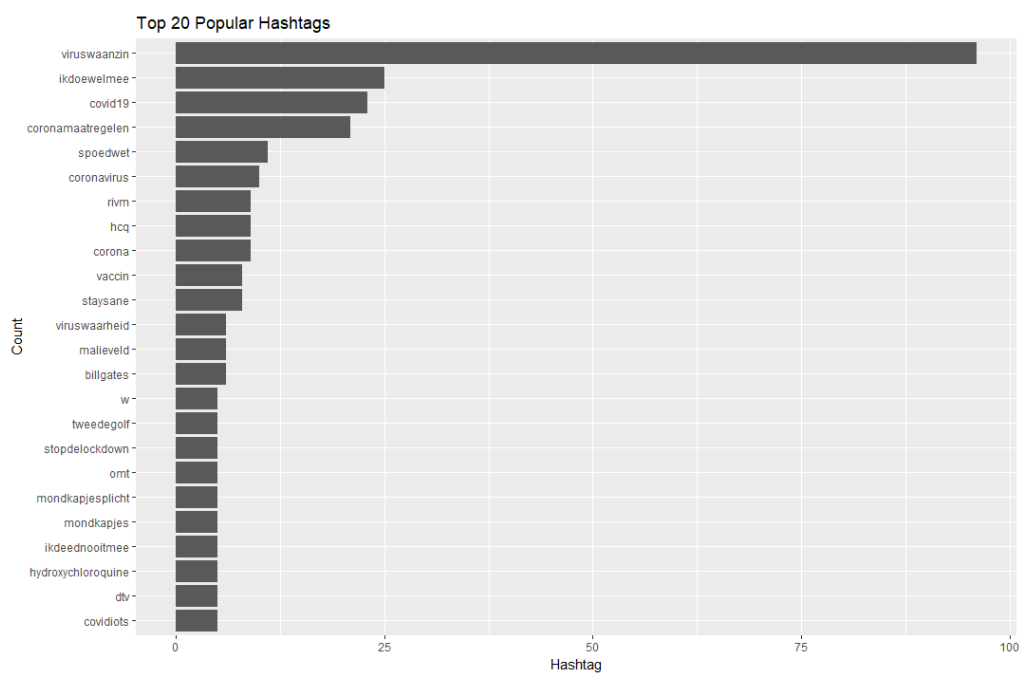*Top 20 most frequently used hashtags in community 19*

Top 20 Popular Hashtags

Figure D14

Top 20 most frequently used words in community 19

Most frequent words

D.6 Community 9

Figure D15

Number of tweets sent per day in community 9

Note. The days on which ore than 30 tweets were sent are marked with a red dot.

Figure D16

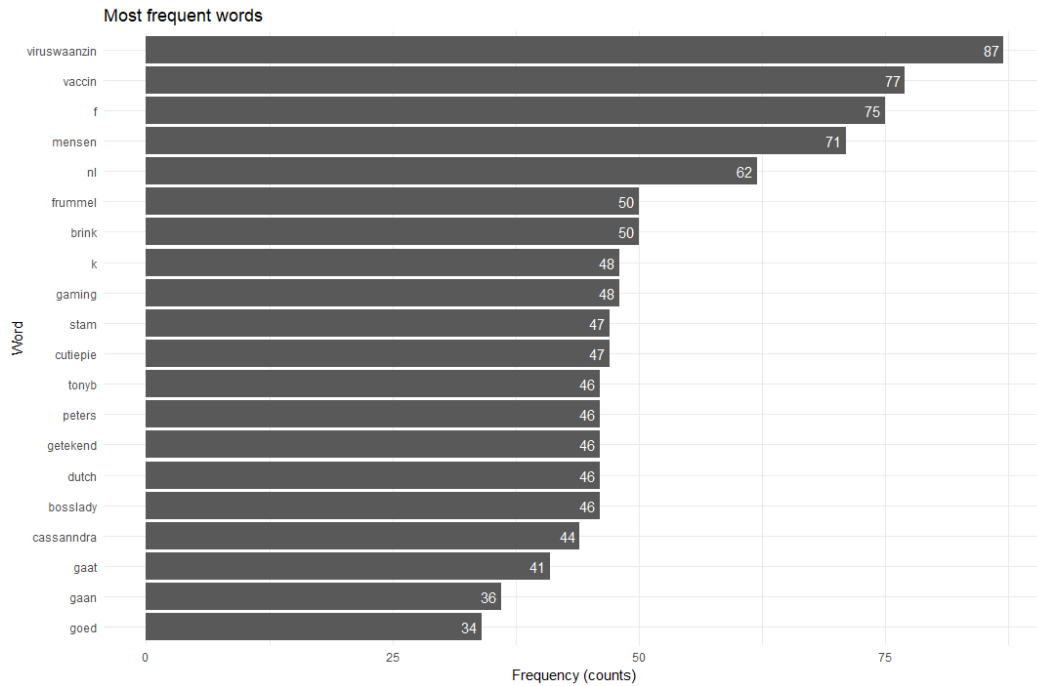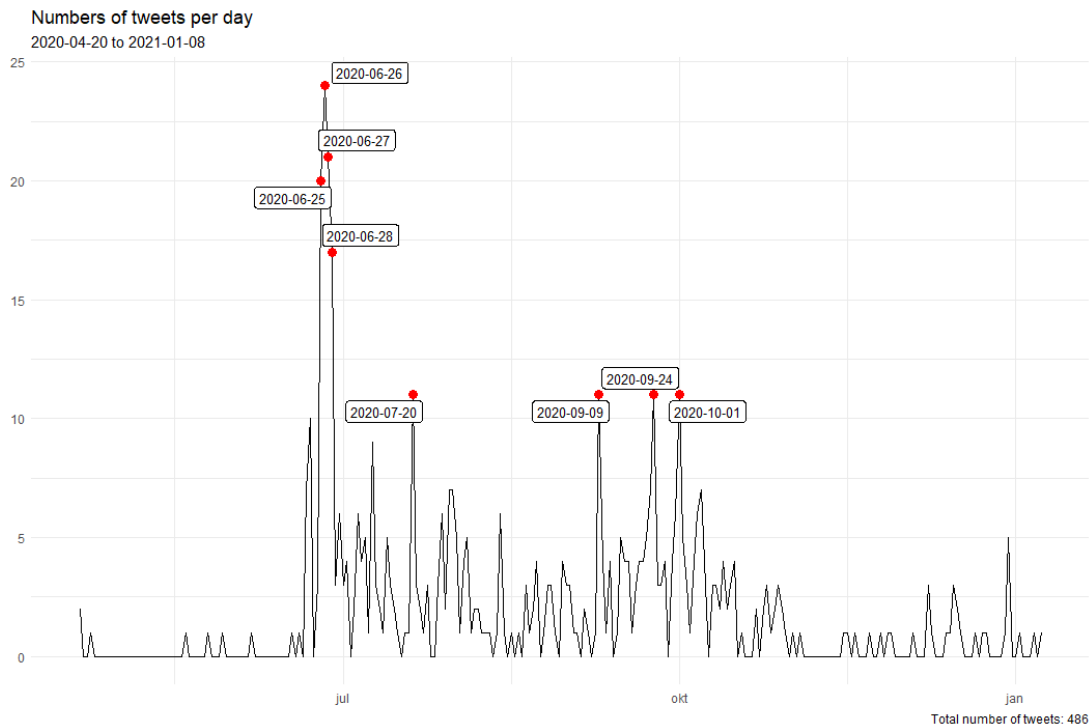*Top 20 most frequently used hashtags in community 9*

Figure D17

Top 20 most frequently used words in community 9

Most frequent words

D.7 Community 7

Figure D18

Number of tweets sent per day in community 7

Numbers of tweets per day
2020-05-01 to 2021-01-17

Total number of tweets: 703

Note. The days on which more than 10 tweets were sent are marked with a red dot.

Figure D19

Top 20 most frequently used hashtags in community 7

Figure D20

Top 20 most frequently used words in community 7

D.8 Community 6

Figure D21

Number of tweets sent per day in community 6

Note. The days on which more than 10 tweets were sent are marked with a red dot.

Figure D22
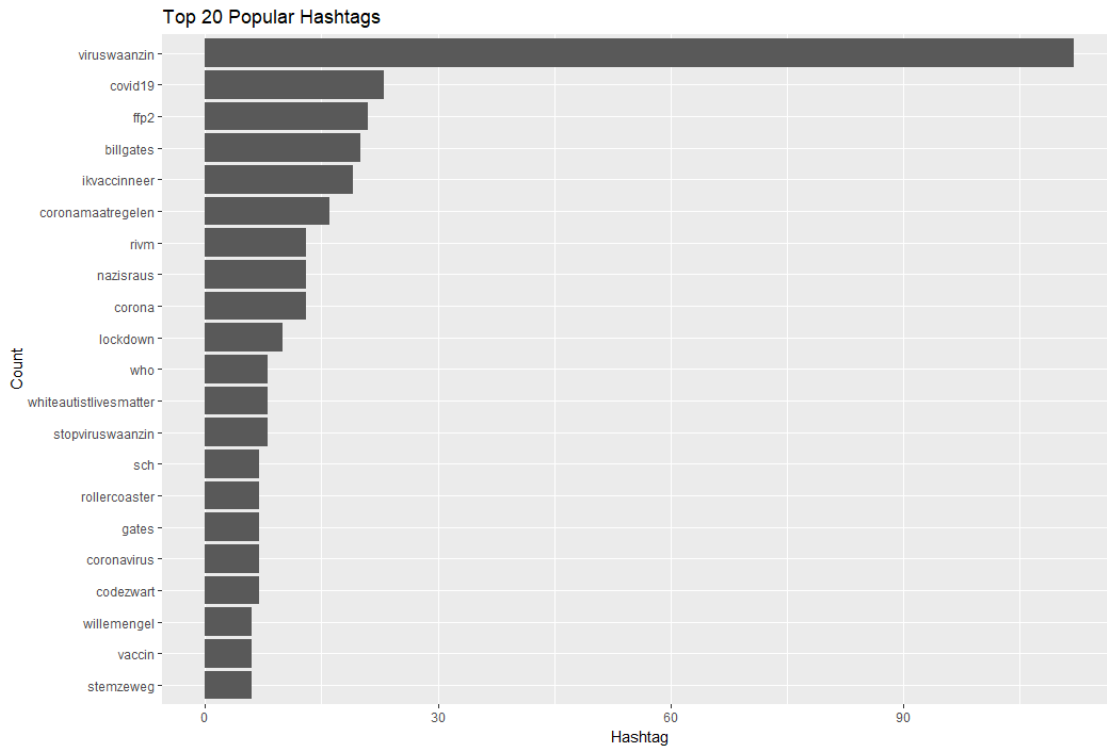
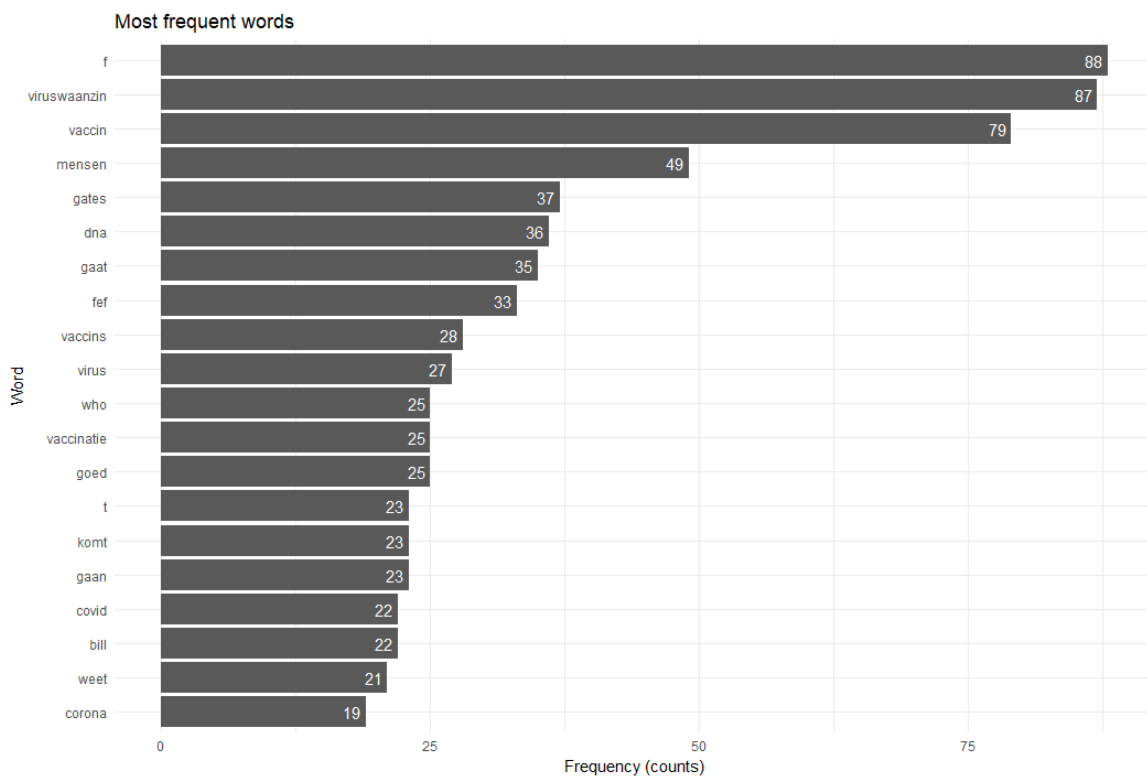*Top 20 most frequently used hashtags in community 6*

Figure D23

Top 20 most frequently used words in community 6

D.9 Community 15

Figure D24

Number of tweets sent per day in community 15

Note. The days on which more than 10 tweets were sent are marked with a red dot.

Figure D25

Top 20 most frequently used hashtags in community 15
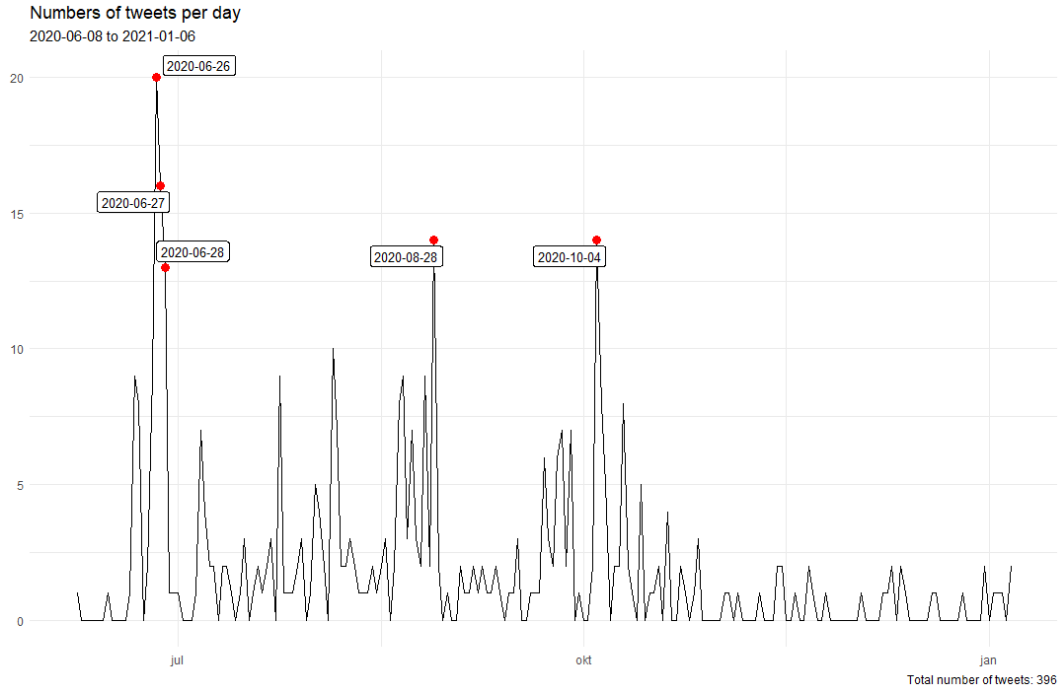

Figure D26

Top 20 most frequently used words in community 15

D.10 Community 12

Figure D27

Number of tweets sent per day in community 12

Note. The days on which more than 10 tweets were sent are marked with a red dot.

Figure D28

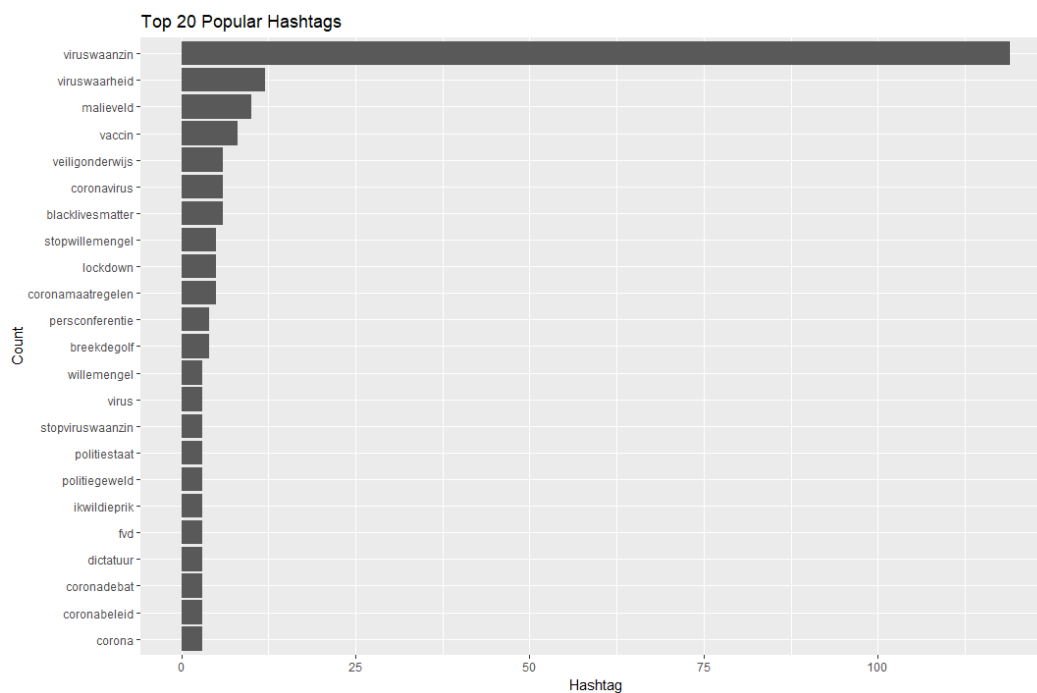*Top 20 most frequently used hashtags in community 12*

Figure D29

Top 20 most frequently used words in community 12